Soviet air force operational theory 1918-1945

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Soviet Air Force Operational Theory, 1918 -1945

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This thesis examines the development of Soviet thinking on the operational employment of their Air Force from 1918 to 1945, using Soviet theoretical writings and Soviet analyses of combat actions written in the period examined. This thesis shows that Soviet theory did not form a monolithic bloc of opinion, nor was it copied wholesale from abroad, but instead was formed in a process of debates founded on fundamentally Soviet concerns about the nature of potential wars and on Soviet views of combats as they occurred. Equally, Soviet theory before World War II was neither wholly prescient, nor utterly flawed. However, Soviet utilization of their theory was crippled in the later 1930s and the early stages of World War II by problems with dissemination of lessons learned and training of air crew and officers. As these problems were overcome, the Soviet Air Force became an increasingly powerful weapon for carrying out the ground force support missions that Soviet theory determined was paramount.

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Equally, this project would have proved impossible without the support of my parents, and of my wife, Corinne Mahaffey.

Abbreviations

ADD: Aviatsii Dal'nego Deistviia, Long-Range Aviation
ANT: Antonov
AON: Aviatsionnie Armii Osobogo Naznacheniia, Special Purpose Air Armies [sic]
BUBA-40: Boevii ustav bombardirovochnaia aviatsiia 1940, Combat Regulations For Bomber Aviation, 1940
BUIA-40: Boevii ustav isterbitel'naia aviatsiia 1940, Combat Regulations For Fighter Aviation, 1940
CSRC: Conflict Studies Research Centre
DB-3: Dal'nii bombardirovshchik - 3, Long-range Bomber -3
DBA: Dal'naia Bombardirovochnaia Aviatsiia, Long-Range Bomber Aviation
IL: Il'yushin
LaGG: Lavochkin, Gudkov, Gorbunov
MiG: Mikoian-Gurevich
MMS: Moto-mekhanizirovanie sili, Motor-Mechanized Forces
NEP: Novaia Ekonomicheskaia Politika, New Economic Policy
NII: Nauchno-issledovatel'nii institut, Scientific Research Institute
OSOAVIAKHIM: Obshestvo Sodeistviia Oborone, Aviatsionnomu i Khimicheskomu Stroitel'stvu, Association for Assistance of Defense, Aircraft and Chemical Development)
PU: Polevoi ustav, Field regulation
PVO: Protivo-vozdushnaya oborona, Anti-aircraft defence
RAF: Royal Air Force
RAG VGK: Reservniie aviatsionniie gruppi Verkhovnogo glavnokomanduiushchego, Reserve Air Groups of the Supreme High Command
RKKA: Raboche-Krestianskaia Krasnaia Armiia, Worker's and Peasant's Red Army
SB: Skorii bombardirovshchik, Fast Bomber
TB: Tiazhiolii bombardirovshchik, Heavy bomber
USAF: United States Air Force
USD: United States Dollars
VVS: Voenno-vozdushniie sili, Air Force
Yak: Yakovlev (Iakovlev)

Introduction

The First World War ended in March 1917 for Imperial Russia. Its successor, the Provisional Government, was forced out when the Bolsheviks seized power in November. The Bolsheviks made peace with the Central Powers in 1918, by which point civil war had already begun to sweep across the steppe. The Civil War shook Russia until 1920, and aftershocks continued to ripple through Siberia and Central Asia for several years thereafter. Unlike much of the First World War, the Russian Civil War involved sweeping movements of forces in dynamic, decisive campaigns. In the decade and a half after the war, a group of gifted Soviet theorists forged a doctrine of maneuver warfare whose basic premises are still in use today. The land warfare aspects of this doctrine, and the course of its development, are becoming increasingly well known in the West. The best known of the Soviet theorists, Mikhail Tukhachevskii, was an ardent supporter of airpower - along with all other means of the mechanization of warfare - but the development of airpower in support of land maneuver operations is associated with the German Luftwaffe, while the concepts underlying the Red Air Force are virtually unknown to most Western readers. This dissertation breaks new ground by analysing the nature and development of Soviet theories of the employment of airpower from 1918 to 1945. The dynamic interplay between theory and practice must also be explored, factoring in Soviet war experience ranging from Chinese warlords in Manchuria to the Luftwaffe's Condor Legion in Spain, the famous disaster at the hands of the Luftwaffe in 1941 through its resurgence in 1942 and 1943, and eventual victory in 1945.

Until recently, most books on aviation history concentrated on one of three things. The most common are still combat histories, which all too often turn out to be tales of aerial derring-do by various figures who are involved in operations whose nature is vague at best – a genre James S. Corum, writing of the Luftwaffe, has called "There I was, at

10,000 feet...."[1] A second common group concentrates on the development of various technical aspects of airplanes, a category often giving rise to books consisting of little but pictures, statistics, and tales of design work. The third category examines the development of strategic bombing in the West, seeking to explain its development, and, often, to explain or condemn the mass bombings of cities or the use of atomic weapons. Fortunately, the field has been widening over the last ten years or so, with an increasing number of historians focusing their efforts on questions such as organization, links to industry, and understanding the conceptual framework governing the employment of air power.

This work falls solidly in the latter category, examining the development of Soviet thinking about the operational employment of airpower – specifically, in its later stages, the employment of Frontal Aviation. While it bears a certain similarity to the histories of strategic bombing by looking at theory, it does not deal with the wider social issues such histories tend to examine. While not denying the importance of technical specifications in aircraft, or the ins and outs of their production, or the abilities of airplanes and crews in various tactical maneuvers, or of the social construction of warfare, these are not the focus of this work. Military aircraft are sent into the air to accomplish missions. The nature of those missions, and the way they are organized and carried out, is based on a theory. That theory may be no more than "Airplanes are a neat way of seeing what's over the next hill," or it might be a complex and sophisticated construct for organizing the destruction of the enemy's combat order throughout its volume by means of the interaction of thousands of sorties of various types. Regardless of its complexity, at the beginning of any air force's actions is some idea providing direction to that action. Therefore, this work does not seek to be a history of the development of the Soviet Air

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[1] Corum, James S., "From Biplanes to Blitzkrieg: The Development of German Air Doctrine Between the Wars", (*War in History*, volume 3, no 1, January 1996), p. 85.

Force's aircraft. It is not a history of the Soviet economy, or pilot training, or maneuvers, or tactical strike methodology, or PVO (National Air Defense), or Naval Aviation. All of these are important and well warrant further study, but they are not the focus here, coming to the fore, if at all, only as they relate to questions of theory.

The central focus of this thesis is the answer to deceptively simple question, "What were they thinking?" It shows how the Soviets approached the employment of airpower, and where possible shows the nature of the debates that occurred on the topic. In turn, it covers several lesser points. Showing the nature of the debate and the development of Soviet thinking demonstrates that the Soviets did not slavishly copy any of several foreign models: foreign influence certainly existed, but foreign ideas were brought in where they suited the Soviet's attitude to air power, and ignored where they did not. Equally, this thesis provides an explanation to the Soviet's relative lack of interest in the strategic bombing concept that enthralled many other air forces' theorists in the 1920s and 1930s. The later two chapters, covering combat experience from 1936 through 1945, highlight both successes and failures in the Soviet ability to learn from their experience, while the section on 1941 explains some of the mysteries surrounding the Soviet disaster in Barbarossa.

The Soviet Air Force itself has been little studied in the West and only slightly more so in unclassified works in Russian.[2] Most of the histories of the Soviet Air Force that have been produced concern themselves primarily with its activities in the Cold War; some of them, notably those by Jacob Kipp, Robin Higham, and Asher Lee[3], have also included a survey chapter on the Soviet Air Force before World War II. Of those with

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[2] It is entirely possible that in-depth studies of the development of Soviet Air Force operational art are buried and classified somewhere in the bowels of the Russian Defence Ministry's archives, but they are unknown to the author.

[3] Kipp, Jacob, and Higham, Robin, eds., *Soviet Aviation and Air Power: A Historical View*, (Westview: 1977), Lee, Asher, *The Soviet Air Force*, (London: Gerald Duckworth & Co., 1950), Lee, Asher, ed., *The Soviet Air and Rocket Forces*, (London: Wiedenfield and Nicolson, 1959); Higham, Robin, Greenwood, John T., Von Hardesty, *Russian Aviation and Air Power in the Twentieth Century*, (London: Frank Cass, 1998).

significant material on the inter-war years, Jackson's *The Red Falcons*[4] covers tactical combat in a "10,000 feet" manner, usually from the viewpoint of the Soviet's adversaries - which makes for odd reading, given the title! Higham, Greenwood, and Hardesty edited a much-needed update to Kipp and Lee's *Russian Aviation and Air Power in the Twentieth Century*[5] in 1998, expanding the material on the inter-war Soviet Air Force though still not concentrating fully upon it. Only one major modern work has concentrated solely upon the inter-war years, V. S. Shumikin's *Sovetskaia voennaia aviatsiia 1917 - 1941*.[6] It covers only the structural and political sides of the Air Force, with some tactical narrative thrown in for spice. For the period of the Second World War, von Hardesty's 1982 *Red Phoenix*[7] still provides an excellent starting point. I. V. Timokhovich produced a number of works on the Soviet Air Force in the 1941-1945 period, culminating in his 1976 *Operativnoe iskusstvo Sovetskikh VVS v Velikoi Otechestvennoi voine* (*The Operational Art of the Soviet Air Force in the Great Patriotic War*).[8] Unfortunately, written in the Brezhnev era, his work suffers from a tendency to pull punches, and Timokhovich's focus is on learning lessons for the present, not the mindset of the past. V. I. Migulin's *Teoriia i praktika primeneniia sovetskikh VVS v mezhvoennii period (1921 - 1941 gg.) Uchebnoe posobie* (*The Theory and Practice of the Employment of the Soviet Air Force in the Inter-War Period (1921-1941) Study Aid)*[9], was for internal use in the Moscow Military-Political Academy's related courses. While useful, it covers a very wide range of themes and does not contain any particular detail on the subject of Air Force employment theory.

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[4] Jackson, Robert, *The Red Falcons: The Soviet Air Force in Action, 1919 - 1969*, (Brighton: Clifton Books, 1969).

[5] Robin Higham, John T. Greenwood, Von Hardesty, *Russian Aviation and Air Power in the Twentieth Century*, (London: Frank Cass, 1998).

[6] Shumikin, V. S. , *Sovetskaia voennaia aviatsiia, 1917 - 1941*, (Moscow: Nauka, 1986).

[7] Von Hardesty, *Red Phoenix: The Rise of Soviet Air Power, 1941-1945*, (Washington: Smithsonian Institute Press, 1982).

[8] Timokhovich, I. V., *Operativnoe iskusstvo Sovetskikh VVS v Velikoi Otechestvennoi voine*, (Moscow: Voenizdat, 1976).

[9] Migulin, V. I., *Teoriia i praktika primeneniia sovetskikh VVS v mezhvoennii period (1921 - 1941 gg.) Uchebnoe posobie*, (Moscow: Voenno-Politicheskaia Akademiia, kafedra istorii voennovo iskusstva, 1988).

The best book in English covering the entire period, Alexander Boyd's *The Soviet Air Force Since 1918*,[10] combines both technical and combat history with more of an eye towards doctrinal development that the others. While of high quality, it covers far more territory than the inter-war years. It is also slowly becoming out of date, and Boyd's source material on Soviet doctrine was very limited.[11]

While access to Russian archives themselves proved impossible due to limited funds, and consequent limited time in Moscow, this thesis nonetheless draws from a wealth of published primary source material that has been largely untapped. The highlights of this material include a complete run of the main Air Force journal, *Vestnik vozdushnogo flota* (*Air Force Herald*) for the period 1918-1941 (wartime issues proving harder to confirm a complete set, due to the chaotic printing schedule), and likewise of the main Army journal, *Voennaia misl'* (*Military Thought*) and its predecessors[12], combined with an extensive collection of books on air power written from 1918 through 1946. For the war years, the declassified *Sborniki dokumentov po izucheniia opita voini* (*Collected documents for the use of war experience*)[13] proved very helpful. Every Soviet formation from the echelon of army and higher, from the summer of 1942 onward, wrote a report on every operation in which it took part. The *Sborniki* collections are the capstone result: compiled and edited after action analysis of Soviet operations by Soviet officers, written during and shortly after the war for a limited professional audience and intended not to glorify but to improve combat performance. While the archives undoubtedly contain extremely useful materials - not least the air army after action

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[10] Boyd, Alexander, *The Soviet Air Force Since 1918*, (London: Macdonald and Jane's, 1977).

[11] Other Soviet works with significant coverage of the entire 1918 - 1941 period: Vasilev, B. A., *Dal'naia, raketonosnaia*, (Moscow, 1972), and the journals *Vestnik vozdushnogo flota*, and *Voennaia Mysl'* and its predecessors, for the period 1918-1945.

[12] *Voennaia misl'* went through a number of title changes: *Voennoe delo* (1918-1920), *Voennaia nauka i revolutsiia* (1921-February 1922), *Voennaia misl' i revolutsiia* (March 1922 – 1924), *Voina i revolutsiia* (1925-1937), *Voennaia misl'* (1937-present).

[13] NKO SSSR, *Sbornik dokumentov po izucheniia opita voini*, volumes 1-25, (Moscow: Voenizdat, 1942-1947).

reports on which the aviation portions of the *Sborniki* were based - this study is possible without them.

The precise nature of the source base for the thesis changes in nature in different chapters, due to the nature of material available. The first two chapters, covering 1918 - 1936, rest primarily on Soviet journal articles and books written at the time. These first two chapters thus base themselves mostly on theoretical writings. The second pair of chapters ground themselves much more firmly in Soviet practice. The compressed time frame and difficult political circumstances of the third chapter, 1936 - 1940, reduced the availability of journal and book sources, but Soviet analyses of the small wars they participated in during this period provide an alternative source of information on the Soviet's evolving viewpoints on aerial warfare. The fourth chapter, covering the Great Patriotic War of 1941 - 1945, relies heavily on the wartime *Sborniki* after-action analyses. While there are no few Soviet post-war analyses of these events, the analyses performed closest to the time itself provide the best window into their thinking about the use of airpower at that time.

Where, then, lies the originality in this work? This is the only work to pay close attention to the development of Soviet Air Force theory from 1918-1945. The material in chapters 1 and 2, covering 1918-1937, covers an especially neglected period and puts the material in the later sections into needed perspective. The third chapter brings new material regarding Soviet analysis and understanding of their experience in small wars from 1936 through 1940.[14] The section covering 1941-1945 is least original, in light of Timokhovich's, Boyd's, and von Hardesty's work, but even this chapter has the advantage of laboring under no censor's restrictions on their conclusions, and better access to sources than was possible for Western authors during the Cold War.

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[14] Note that sections of this chapter appeared as James Sterret [sic], "'Learning is Winning': Soviet Air Power Doctrine, 1935 - 1941", (Sebastian Cox, Peter Gray, eds, *Air Power History: Turning Points from Kitty Hawk to Kosovo*, (London: Frank Cass, 2002), pp. 173-187.)

This thesis begins with a very brief overview of the development of Soviet operational theory for land war. The Soviet Air Force had a significant role to play in these concepts, and, this thesis will show that most Soviet air force theorists considered it axiomatic that the Air Force's activities must complement those of the Army. Therefore it is necessary to understand the basic outline of the land side of the Soviet view of warfare before turning to the genesis of the air side. The thesis then continues to a brief overview of the Imperial Russian Air Service and the Soviet Air Force in the Russian Civil War, continuing from there to cover the development of Soviet Air Force theory up to 1928. Funding played an important, if subtle, role in the debate in this period. The Soviet Air Force was not under threat of extinction in the aftermath of the Civil War, despite the devastated Soviet economy, because of many supporters at all levels of government. This ensured that while Air Force's funding was not generous, neither did it need to fend off serious calls for its elimination or amalgamation into another branch. Nonetheless, the level of industrial support available was important in shaping the debate in this era and in differentiating it from that which followed. In military terms, the period after the Civil War was one of relative quiet, which gave the Soviet Air Force time to rebuild and learn to operate in peacetime, and theorists time to ponder and argue – though a fully coherent doctrine did not emerge.[15]

The advent of the first Five Year Plan (1928-1933) changed the ground rules of debate. Previously, Soviet theorists basing their predictions in the realities of the day assumed a small Soviet Air Force into the foreseeable future. Now, those theorists who had previously pointed to a vague future in which they hoped there might be a large and powerful Soviet Air Force could claim to ground their arguments in reality. Furthermore,

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[15] The four most important works in the period were: Mezheninov, S. A., *Vozdushnioe sili v voine i operatsii*, (Moscow: 1927), Lapchinskii, A. N., *Taktika aviatsii*, (Moscow: Avioizdatelstvo, 1926), A. V. Sergeev, *Strategiia i taktika Krasnovo vozdushnovo flota*, (Moscow: Vestnik Vozdushnovo Sila, 1925), and A. S. Algazin, *Obespecheniie vozdushnikh operatsii*, (Moscow: Gosizdat, 1928).

operational theory, which had begun to enter Air Force thinking in 1927-1928, expanded widely and flowered. Buoyed by the productive force of their new industries, the Soviets experimented extensively with making their new theories work in practice, and tried to sharpen their theories in the light of the experience thus gained.[16]

Theory got its first real test when the Soviets sent military assistance, including aircraft and crews, to assist the Republicans in the Spanish Civil War. From this point until Barbarossa the Soviets were involved in a series of small wars: in Spain, China, Mongolia, and Finland. The last of these proved a great shock to the Soviet leadership and resulted in crash programs to try to better prepare the military for war. The impact of Soviet air campaigns in Spain, Finland, and elsewhere on the development of theory from 1938 to 1941 is shown primarily through Soviet analysis of these wars – a process complicated by the execution of many of the best and brightest theorists in the purges. By the end of this period, the Soviets were still lacking a consensus on a theory of air force operations.[17]

Despite crash programs to improve their combat readiness after the Finnish War, the Soviet Air Force was devastated in a carefully planned and well-executed operation when the Luftwaffe struck on June 22, 1941. Most Soviet works pass over the initial period of the war with a description of the devastation of the Luftwaffe's initial strike, and the difficulty the air supremacy thus seized caused the Red Air Force, then skip forwards to happier times. No satisfactory explanation has been put forward for the Soviet vulnerability to the initial blow, but this study sheds more light on this problem and

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[16] Among the major works of the period: Lapchinskii, A. N., *Vozdushniie sili v boiu i operatsii*, (Moscow: Voenizdat, 1932), Algazin, A. S., *Aviatsiia v sovremennoi voine*, (Moscow: 1935), Khripin, V. V., *O gospodstve v vozdukhe*, (Moscow: 1935), also the aviation portions of *Polevoi Ustav 1929*, and *Vremennii Polevoi Ustav 1936*.

[17] Key sources for this chapter include: *Voina v Ispanii: Boevie deistviia aviatsii (s nachala miatezha po avgust 1937)*, (Moscow: Razvedivatelnaia Upravleniia RKKA, 1938), *Voina v Ispanii: Boevie deistviia aviatsii*, (Moscow: NKO SSSR, 1937), *Boevie deistviia VVS KBF v voine c Belofinnami (c 30 noiabria 1939 g. Po 13 marta 1940 g.)*, (Moscow: Gosvoenmorizdat SSSR, 1941), Zolotarev, V. A., et al., *Russkii arkhiv: Velikaia otechestvennaia. Tom 1, Nakanune voini: Materiali soveshchaniia vishchevo rukovodiashchego sostava RKKA 23-31 dekabria 1940 g.*, (Moscow: Terra, 1993).

follows the overall development of Air Force operations through the 1945. The Soviet Air Force steadily improved over the course of the rest of the war, re-inventing much of its theory in order to support combat operations in progress as seen through the lens of their after-action reports. By the end, the Soviet Air Force had been honed into a powerful weapon, with an operational doctrine emphasizing powerful surges of massed air power in support of major land offensives – a doctrinal emphasis retained ever since.[18]

There are few studies of the Soviet Air Force in this era at all, and this work begins to fill that gap: but much work remains to be done on the topic. We still know very little about the main Soviet airpower theorists, especially those in the 1920s and early 1930s. Archival access would shed light on the workings of their doctrinal debate in the corridors of the General Staff. Other blank pages include the evolution of the tactical employment of their aviation, both in peacetime and wartime; detailed analysis of specific air operations and series of such operations; and the details of the reasoning and debates behind aircraft design requirements and aircraft adoption. For such further studies, this work provides a framework for understanding the way the Soviets thought about airpower, permitting us to understand the Soviet decisions of the time inside the historical Soviet frame of reference.

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[18] Pankin, V. E., ed., *1941 god - opit planirovaniia i primeneniia voenno-vozdushnikh sil, uroki i vivodi (po materialam voenno-nauchnoi konferentsii rukovodiashchevo sostava tsentralnovo apparata VVS, posviashchennoi 70-letiiu Sovetskoi Armii i Voenno-Morskovo Flota)*, (Moscow: Tsentr operativno-takticheskikh issledovanii VVS Ministerstvo oborni SSSR, 1989), Kozhevnikov, M. N., *Komandovanie i Shtab VVS Sovetskoi Armii v Velikoi Otechestvennoi voine 1941 - 1945. (Izdanie vtoroe, ispravlennoe i dopolnennoe)*, (Moscow: Nauka, 1985); NKO SSSR, *Sbornik dokumentov po izucheniia opita voini*, volumes 1-25, (Moscow: Voenizdat, 1942-1947); Timokhovich, I. V., *Operativnoe iskusstvo Sovetskikh VVS v Velikoi Otechestvennoi voine*, (Moscow: Voenizdat, 1976).

Chapter 1: Early Concepts
From the Imperial Russian Air Force to the Eve of the First Five Year Plan
1900 - 1928

Before discussing the development of the Soviet Air Force's theories, we must turn to a brief discussion of how the Soviets understood the concept of operational art in the 1920s and 1930s. This is necessary for several reasons. First, because the subject of this work is the employment of the air force, primarily at the operational level, it is necessary to provide a working understanding of how the Soviets understood the nature of this level of war. Second, this overview discusses it from the perspective of land warfare, both because Russian and Soviet understanding of the operational level of war first arose regarding land warfare, and because the activity of the Soviet Air Force was expected to be directly related to the activity of the Soviet Army, though on occasion the extent of the tie between them was a source of contention. Since the Soviet Army increasingly utilized the concepts of operational art and successive deep operations, the activity of their Air Force is not comprehensible without reference to that framework. An understanding of the operational level of war is also necessary for understanding Soviet concepts of independent air operations as well. Thus, this chapter begins with the rise of the notion of the operational level of war in Russia and the Soviet Union, then discusses how the Soviets understood the concept as it evolved, moving on to the outline of how they expected the Air Force to fit into Army operations, as a prelude to the close examination of the development of the Soviet Air Force's theories that follows.

The roots of Soviet understanding of the operational level of war stretch back into the later 19th century Imperial Russian Army, when various officers, notably Genrikh Leer, began to develop the notion of theater tactics as distinct from battlefield tactics and national strategy. Leer`s position as chief of the General Staff Academy from 1889 to

1898 gave him an excellent opportunity to pass on his developing ideas to junior members of the Russian officer corps. Thinking on the operational level of war began to develop more fully in the aftermath of the Russo-Japanese War (1904-1905), albeit amidst much debate over its validity. Many of the Soviet Army's best theoreticians, including Aleksandr Svechin and Mikhail Tukhachevskii, began their careers as officers in the Tsar's army during this period of intellectual ferment, and carried that intellectual legacy to the new regime - even if this heritage went unacknowledged by the Soviets.[19]

The Soviets developed their concepts of operational art over the course of the 1920s and 1930s. The term itself, coined by Aleksandr Svechin for a lecture in 1924[20], rapidly gained acceptance. In the Soviet understanding at the time, operations and operational art occupied a middle ground between the battle-fighting of tactics and the strategy of fighting the entire war. To quote two of the key formulators of these definitions,

In grouping battles, the modern operation is a complex act; it is understood as the totality of maneuvers and battles on a given sector of a theater of military operations directed toward achieving the overall aim....[21]

All branches of the art of war are closely interrelated: tactics takes the steps that make up an operational leap, and strategy points the way.

In the art of war an operation means a combination of different actions aimed at achieving a goal set forth by strategy. Several operations integrated in time and space form a campaign....[22]

The Soviets saw the stalemate of World War I as arising from a process driven by improvements in technology and industry, by which the Napoleonic strategy of a single

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[19] See Richard W. Harrison's *The Russian Way of War: Operational Art, 1904-1940* (Lawrence: University of Kansas Press, 2001), chapter 1, which provides a thorough discussion of this legacy and its transmission.

[20] Jacob W. Kipp, "General-Major A. A. Svechin and Modern Warfare: Military History and Military Theory", (foreword to Aleksandr A. Svechin, *Strategy*, (Minneapolis: East View Publications, 1992), pp. 23-56), pp. 37-38.

[21] N. Varfolomeev, "Strategy in an Academic Formulation", (*Voina i revolutsiia*, Book 11, 1928, pp.78-93), [translated in Harold S. Orenstein, *The Evolution of Soviet Operational Art: The Documentary Basis: Volume I: Operational Art, 1927-1964*, (London: Frank Cass, 1995), pp. 33-47], p. 38. Varfolomeev held the chair of "Conduct of the operation" at the Frunze Academy from 1924 (when the position was founded) to 1927 [Jacob Kipp, *Mass, Mobility, and the Red Army's Road to Operational Art, 1918-1936*, Soviet Army Studies Office: Fort Leavenworth, undated, pp 18-19].

[22] Svechin, *Strategy*, p. 269. Svechin's service in the Soviet Army was nearly entirely spent teaching in various academies [Harrison, *Russian Way*, p. 129].

point, in which approach marches culminated in a day of decisive battle, spread into the multiple sequenced, but disconnected, engagements seen in the Wars of German Unification. These disparate battles, in turn, had melded into a continuous line during the Russo-Japanese War, and that line, in turn, extended its flanks to the limits of available terrain in World War 1. Unable to maneuver onto a flank to avoid losses from enemy firepower, armies had to find a means of penetrating the front line directly. They tended to fail because, as Georgii Isserson wrote of the German offensives in 1918:[23]

> There were no operational echelons to develop the penetration, and this reflected the entire indirect influence of the already obsolete linear strategy. [...] *It is senseless to break down a door if there is no one to go through it.*[24]

A key work in developing the concept for ensuring someone could go through the door, V. K. Triandafillov's *The Nature of the Operations of Modern Armies*[25] examined numerous problems of operations, from approach marches, to sustainment, to combat. He saw the solution to the problem of the operational engagement in the concept of depth: that armies deployed not only along a width of front, but into the areas behind it, generating issues of time. If an infantry corps marching to the front is 30 miles long, the lead elements of the corps may enter battle more than a day in advance of the rear guard. From looking at these problems, they realized that the staying power, defensive operational depth, and offensive logistical limitations on the abilities of modern armed forces was such that a single battle or campaign was very unlikely to destroy an enemy's military. Combining this realization with their understanding of operational art produced the concept of 'successive operations'. Successive operations required planning each operation so that it would not only be within the combat and logistic capabilities of the

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[23] G. S. Isserson, "The Evolution of Operational Art", (*Voina i revolutsiia*, 5-6 (1932), pp. 25-52), [translated in Harold S. Orenstein, *The Evolution of Soviet Operational Art: The Documentary Basis: Volume I: Operational Art, 1927-1964*, (London: Frank Cass, 1995), pp. 48-77].

[24] Isserson, "The Evolution of Operational Art", p. 76. At the time of writing this article, Isserson was the Chief of the Operations Department of the Frunze Academy [Harrison, *Russian Way*, p. 203]. Emphasis in original.

[25] V.K. Triandafillov, *The Nature of the Operations of Modern Armies*, (London: Frank Cass, 1994), translated by William Burhans.

forces available, but also planning a set of sequential (and sometimes concurrent) operations, using either the same or adjacent groups of forces, so that the combined effect was greater than the sum of the individual efforts and achieved a significant strategic goal: each operation setting up the preconditions for the successful prosecution of the succeeding ones. An obvious predecessor to this is the Allied offensives in the 100 Days of 1918. However, the Soviets intended not a series of small bite-and-hold attacks, but offensives to advance one hundred kilometers or more. They expected this level of manoeuvre partly because of the nature of World War One on the Eastern Front - somewhat more mobile that that in the West - and partly because of their experiences in the Russian Civil War, which was often very mobile. Successive operations, then, is a general prescription for what operational art is intended to accomplish. The specific application paired the tactical concept of Deep Battle with the operational concept of Deep Operations.

Deep Battle came from the Soviets' study of recent wars and the application of the concept of depth to the problem of overcoming tactical defences. Most elements of the solution had appeared on the Western Front in World War One - including hurricane bombardments for suppression, improved flexible infantry tactics, effective counterbattery work, and support from aircraft and armour. Combined into a coherent whole and called 'Deep Battle' during the later 1920s, it began to appear in official manuals with the *1929 Field Regulations*, and was more explicitly laid out in the 1932 *Instructions for Deep Battle* and the *1936 Field Regulations*. The essence of the concept was the recognition that each tactical element had its own special role to play, and that all must work together to overcome the enemy defence throughout its depth:

> For the defeat of the enemy it is not sufficient to concentrate superior strength and equipment. Cooperation is required across the entire depth of the battle of all

> forces, acting on a given axis, as are supporting actions by forces fighting on other axes.'[26]

The combination of artillery, aircraft, infantry, and tanks, working together, could create an extremely violent, fast-moving attack capable of cracking the enemy defence and forming a workable breakthrough at acceptable cost to the attacker. The enemy defence was expected to be arrayed in depth, from the outpost line to the heavy artillery and mobile reserve. Friendly forces were intended to engage all of these positions simultaneously in order to prevent the various elements of the defence from supporting each other. In addition, friendly forces were to be echeloned in depth, with the initial wave in the front line and successive groups of assault forces held in the rear to exploit success and drive into the enemy's defensive array, expanding the breach and driving into the deeper parts of the enemy defence. The ultimate objective of the battle was to pass subsequent echelons beyond the enemy defences to exploit the breakthrough into undefended areas. Deep Battle was a solution to the problem of breaking a dug-in defence by the synchronized application of massed, mobile firepower - and in order to prevent presenting a dense target array to the enemy, the forces producing this result had themselves to be arrayed in depth.

The expansion of this concept into the operational realm the Soviets called Deep Operations, which were developed on the basis of Deep Battle, and laid out in the *1936 Temporary Field Regulations*. The combination called for a

> … simultaneous assault on enemy defences by aviation and artillery to the depths of the defence, penetration of the tactical zone of the defence by attacking units with widespread use of tank forces, and the violent development of tactical success into operational success with the aim of the complete encirclement and destruction of the enemy.'[27]

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[26] *Polevoi ustav 1929*, p. 12. Emphasis in original.

[27] *Polevoi ustav 1936*, quoted by V. Daines, 'Razvitie taktiki obshchevoiskogo nastupatelnogo boia v 1929 – 1941 gg`, *Voenno-istoricheskii zhurnal*, 10/1978, as translated by David Glantz, *Soviet Military Operational Art*, p. 79.

Deep Battle was the tactical prerequisite for this style of operation. By enabling Soviet forces to blow holes in the enemy lines, it enabled forces echeloned in depth to exploit tactical successes and develop them into an operational gains. The primary exploitation forces were expected to be armoured, assisted by airborne forces inserted to seize key points whose control would ensure the tanks could move as rapidly as possible. Aircraft would provide both tactical support once the exploiting forces had outrun the range of friendly artillery, and interdiction of enemy logistical systems and reserve movements. The entire operation was intended to unfold swiftly, using careful synchronization to make maximal use of the disruption caused by the high tempo of the breakout. In keeping with the concept of successive operations, each operation was to seize objectives that set up the conditions for subsequent operations' success. Successive deep operations were expected to accomplish decisive campaigns, and the Soviets spent much of the early and middle 1930s building a force structure to conduct Deep Operations, and testing it in large exercises. Experimentation with these ideas ground to a halt in 1937, when many of the best and brightest of the Soviet theorists were shot in the purge of the military.

Both the Soviet Army and the Air Force intended the Soviet Air Force to play a major role in operations. Soviet Army theoreticians intended the Air Force to provide firepower in the depths, which we would call Air Interdiction. Matters were not quite so clear-cut from the point of view of the Soviet Air Force. Over the course of the period under study, it wrestled with the issue of its role and how to accomplish it. The rapidly changing technical capabilities of aircraft kept the question of what was tactically feasible open. Since any force would be ill-advised to attempt tactically impossible missions, these changes in technology in turn kept open the issue of which missions the Air Force could or should attempt to accomplish, and the relative priority and sequence of those

missions. This in turn linked up to the strategic sphere, as emphasis on different missions suggested different force structures and directions of research, development, and production to emphasize. The Soviet Air Force agreed that its mission was to support the Soviet Army. In detail, however, we find a far less unified picture, not least in the debate as to what 'supporting the Army' actually meant. The tale of the Soviet Air Force, like that of its ideas, begins before the existence of the Soviet Union, in the Imperial Russian Air Service.

While Imperial Russia evinced interest in aviation, in 1914 its air force, while large, was no more formidable than its equally large army. The Soviets inherited some of the wreckage of this force, and worked on turning it into a battleworthy force. The Soviets inherited a grab-bag of pilots and officers from Imperial Russia, one of whom, a former teacher from Kiev named Aleksandr Nikolaevich Lapchinskii who served as an observer/navigator during the First World War, turned out to be the Soviet's most prolific and coherent theorist on air power until his death in 1938. Soviet thinking about airpower, just as Soviet thinking about land power, included a willingness to throw away the past. However, until the First Five Year Plan in 1928, the Soviets were equally faced with the stark reality that they had few aircraft and little means with which to produce them. This, combined with the debatable nature of the future capabilities of airpower, formed the dominant theoretical split of the timeframe up to 1928, driving the nature of debate over cardinal issues such as the nature of the mission of the air force, and to whom it should be subordinated. These issues were not resolved by 1928. However, the initiation of the first Five Year Plan demonstrated that the future could reliably be expected to include large numbers of advanced aircraft for the air force, thereby changing the basic nature of debate.

Imperial Russia's interest in aviation increased as the 19th century wore on, to the point that by 1895 observation balloons were a common feature in manoeuvres, and these balloons played a useful role in the 1904-1905 Russo-Japanese War. Investment in heavier-than-air machines increased sharply after the Grand Admiral, Grand Duke Alexandr Mikhailovich, noticed the implications of Bleriot's flight across the English Channel in 1909. Stating that 'victory in a future war will be impossible without an air fleet', he put funds and institutional muscle towards the acquisition of aircraft and the training of pilots. By the outbreak of war, Russia had several firms producing aircraft. While most of them were foreign, the star of the lot, Igor Sikorsky's firm, was domestic and producing advanced aircraft. As a result of this attention, at the outbreak of war Imperial Russia's military had 244 aircraft – more than Germany's 232 or France's 138.[28]

This apparent strength masked numerous underlying weaknesses. Imperial Russia was capable of building 400 aircraft a year, as opposed to Germany's 1348 in 1914, and its aircraft engine production capability was especially weak. These problems left Russia dependent on deliveries from the Western Allies. In addition, pilot training facilities were too few to keep up with the demand – reduced though that demand was by lack of aircraft – and many in the high command had little concept of the value of aviation throughout the war. There were bright spots: Major General M. V. Shidlovskii's squadron of 4-engine Sikorsky 'Ilya Muromets' heavy bombers could and did deliver ordnance up to 150 miles behind enemy lines, but this squadron rarely had more than 25 machines in flying condition. General Brusilov concentrated 100 aircraft for his 1916 offensive, and conducted large-scale bombing raids with groups of 20 or more aircraft in order to try to disrupt Austro-Hungarian airbases and railroad stations on the Lutsk axis. However, it is important not to over-rate the importance of these actions. Often, half of Brusilov's 100

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[28] David Jones, 'The Beginnings of Russian Airpower, 1907-1922', (Higham, Kipp, eds, *Soviet Aviation and Air Power*; pp. 15-34); pages 16-20, Quote from page 17; Kork, A., 'Rol' aviatsii v sovremennoi voine', (*Voennoe Delo*, September 13, 1918, pp. 15-17), p. 15.

aircraft were unable to fly, and of those flying only half were judged 'fully capable for combat missions'. When the Germans reinforced the Lutsk sector, air superiority passed immediately and irrevocably to them. In general, innovation was a slow affair and generally worked upwards from pilots. While they tried all conceivable manner of missions during the war, the vast majority of sorties flown by Imperial Russia in World War I, over 90%, were nonetheless reconnaissance missions. By December 1917, Russia fielded all of 579 aircraft, with a further 1,500 in various states of storage, repair, or training use.[29]

The revolutions of 1917 fragmented the Russian armed forces, and the air force was no exception. Many pilots went home, or to the Whites; an unknown number of others, including Shidlovskii, were shot by their subordinates. Only a handful wound up joining the fledgling Red Air Force; by 1918 only 33 flights of 6 aircraft remained of 91. By late 1919 the Soviets managed to scrape together around 300-350 machines, and managed to maintain this approximate strength throughout the rest of the Civil War.

Despite the numerous difficulties of keeping flyable aircraft at the front, which seriously strained repair and production abilities devastated by effects of the revolution, the most serious shortfall was in trained aircrew. There were at most 300 of these in 1919, and an average loss rate of 50% per year made it difficult to improve on that number. Furthermore, the lack of training led to enough accidents – a disastrous average of one crash per 10 to 15 hours of flying in 1919 – that one article railing against it was entitled

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[29] Kork, 'Rol' aviatsii', p. 15-16; Jones, 'Beginnings', pp. 20-26; Timokhovich, *Operativnoe iskusstvo*, p. 8; V. S. Shumikin, *Sovetskaia voennaia aviatsiia 1917 – 1941*, (Moscow: Nauka, 1986), pp.10-11, 33, 51-58; Uskov, N. P., *Razvitie voennogo iskusstva v period pervoi mirovoi voini (1914 – 1918 gg). Boevoe primeneniie aviatsii (Glava 6, Istoriia voennogo iskusstva i istoriia aviatsii: uchebnik)*, (Monino, 1957), pp. 29-31, 79; Nazin, I., Barakov, I., Latishev, A., 'Aviatsiia v Brusilovskom prorive', (*Voenno-istoricheskii zhurnal*, 12, 1940) pp. 110-117; Alexander Boyd, *The Soviet Air Force*, p. 1.

'Destroyers and Self-Destroyers'. With effort, the training and equipment situation did improve over the course of the war, albeit slowly.[30]

The combat employment of the available aircraft was extremely haphazard at first, with small groups, rarely reaching as many as 30 aircraft, sent to every front of the Civil War in 1918, in an attempt to shore up Soviet positions. Fortunately, at that time the air war was not intense, as indicated by the total of six dogfights recorded in 1918, and the Soviets had time to attempt to remedy their efforts. In 1919, a group of senior air officers, including A. N. Lapchinskii, wrote the *Nastavleniie po primeneniiu aviatsii na voine RKKA: Proekt* (*Regulations on the Employment of Aviation in War, RKKA: Project*) on the basis of experience at Tsaritsin and laid out a rule which would become one of the central themes in Soviet Air Force thinking:[31]

> 'Due to our general insufficiency of military aviation, it is necessary to accept a basic rule: *group them on the most important directions, completely starving secondary directions or serving them in extreme cases with single detachments and those with the smallest possible number of aircraft*....'[32] [Emphasis added]

Aircraft were increasingly brought under centralized command in the Field Directorate of Aviation, which, combined with improvements in the Soviet transport

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[30] Jones, 'Beginnings', p. 26-27; Boyd, Soviet Air Force, p. 2; Shumikin, Sovetskaia voennaia aviatsiia, p. 18-22; Shishov, L., 'Sovershenstvovanie sposobov boevogo primeneniia Sovetskoi aviatsii v godi grazhdanskoi voini', *Voenno-istoricheskii zhurnal*, 12, 1973, pp. 27-34, p. 27; A. N. Lapchinskii, 'Uspekhi aviatsii na zapade', *Vestnik vozdushnogo flota*, 1,1920, pp. 5-6, p. 6; Lapchinskii, 'Aviatsionii 'patriotizm'', *Vestnik vozdushnogo flota*, 1, 1920, pp. 9-10, p. 9; Nevolin, 'Istrebiteli i samoistrebiteli', *Vestnik vozdushnogo flota*, 3-4, 1920, pp. 15-16; G. L., 'Itogi aviatsii v 1919 g.', *Voennoe Delo*, May 22, 1920, pp. 339-346, p. 342-343. [Note: In Russian, 'istrebitel', 'fighter aircraft', literally means 'destroyer' and is translated here literally to maintain the pun in 'Istrebiteli i samoistrebiteli'. Elsewhere it is translated 'fighter' to match common English language usage.]

[31] Boyd, *Soviet Air Force*, pp. 3-4; Jones, 'Beginnings', 27-28; Pliachenko, P., 'Trudi po teorii boevogo primeneniia Sovetskikh VVS (1918 - 1940 gg.)' (*Voenno-istoricheskii zhurnal*, 8, 1970, pp. 82-88) p. p. 82; Shishov, L., 'Sovershenstvovanie sposobov, pp. 28, 31 – 33; Lapchinskii, A. N., 'Iz boevikh deistvii aviatsii 9-i armii' (*Vestnik Vozdushnogo Flota*, 1, 1920, pp. 27-30), p. 27; G. L., 'Itogi', p. 343-344, *Nastavlenie po primeneiiu aviatsii na voine Raboche-Krestianskoi Krasnoi Armii. Proekt.*, (Moscow: Polevogo upravleniie aviatsii i vozdukhoplavania pri Shtaba Revvoensoveta Respubliki, 1919), p. 25, as quoted in Shishov, L., ''Sovershenstvovanie', p. 33.

[32] *Nastavlenie po primeneiiu aviatsii*, p. 25, as quoted in Shishov, L., 'Sovershenstvovanie', p. 33. Unfortunately, I was not able to find a copy of this regulation – it would be very interesting to know who wrote it. Lapchinskii's participation is noted in Irtiuga, M., 'Kombrig A. N. Lapchinskii', (*Voenno-Istoricheskii Zhurnal*, 7, 1972, pp. 122-125), p. 123. The issuing authority is listed in Pliachenko, 'Trudi', p. 82. It is logical to assume that A. V. Sergeev, then the head of the Polevogo upravlenie aviatsii i vozdukhoplavania, was also involved.

system, made it possible to put more and more aircraft on one axis. Nearly 100 aircraft were concentrated against Kolchak in 1919, and 210 supported Tukhachevskii's drive on Warsaw in 1920. At the same time, the intensity of the air war rose, with 23 dogfights in 1919 and 93 in 1920 – most of the latter against the Poles. Fifteen of Sikorsky's four-engine Ilya Muromets bombers were brought together with about 20 other heavy aircraft into a 'Special Purpose Aviation Group' in August 1919 to form a strike group of heavy bombers. This group engaged in both close air support, including low-level strafing of enemy cavalry on Lenin's orders, and at least one strike on an enemy airfield, claiming 10 enemy aircraft destroyed. Additionally, these aircraft conducted air interdiction against various targets such as railroad stations and supply dumps, and there are numerous testimonials to the effectiveness of their close air support and reconnaissance work. Lighter bombers occasionally formed groups of 8 to 15 aircraft for concentrated strikes. Overall, Soviet Air Force official statistics claim 19,377 sorties flown in the Civil War, for 27,566 hours and 94,508 kilograms of bombs dropped.[33]

However, the official statistics do not square well with other data – that there were 800 sorties flown against Admiral Kolchak in the east during 1919, and 2100 on the Western Front in 1920, and a total of 3250 hours total in 1919. The official statistics are probably either inflated, include numerous non-combat flights such as pilot training, or both. Losses in accidents, over 390, were nearly 5 times greater than those in combat, 83, which latter figure compares poorly to the claimed 21 kills in aerial combat. Even these figures are low if the claimed numbers of aircraft repaired and built during the war – 1574 and 669 – are to be made to jibe with claims of an average strength of 350 machines by

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[33] Boyd, *Soviet Air Force*, pp. 3-4; Jones, 'Beginnings', pp. 27-29; Pliachenko, 'Trudi', pp. 83-84; Shishov, 'Sovershenstvovanie', pp. 28-29, 32; Tsikin, A., 'Maloizvestniie dokumenti o sozdanii tiazheloi aviatsii', (*Voenno-Istoricheskii Zhurnal*, 11, 1974, pp. 64-68), pp. 64-68; Baranovskii, V. A., 'Tiazhelaia aviatsiia', (*Vestnik vozdushnogo flota*, 3-4, 1920, pp. 12-13), pp. 12-13; G. L., 'Itogi', p. 344; Tukhachevskii, M. N., 'Taktika aviatsii', (*Voennoe delo*, July-August, 1920, pp. 87-94), p. 92. Official statistics from Jones (his source is not clear from his bibliographical notes; the figures are termed 'official' in his text.)

the end of the war. However, even if the actual figures are murky, it is quite clear that the Soviet repair, construction, and logistical organization operated at full stretch to keep aircraft available.[34]

The shortage of trained pilots, mentioned earlier, was even more desperate. The pilot training troubles were worsened by the nature of those aircraft available. In late 1920, of 70 air detachments and four flights, 76% were reconnaissance, 18% were fighters, and the remaining 6% accounted for bombers, photoreconnaissance, and artillery correction. However, shortages forced most air units to conduct all manner of work, preventing the pilots from specializing so as to learn any one job well. It should come as no great surprise that complaints about the effectiveness of aircraft were not few.[35]

Even aviation's supporters complained of its shortcomings. A summary of progress in aviation work in 1919 noted that group bombing by even as many as five aircraft was rare, and that artillery correction had been practiced in only two armies. Tukhachevskii noted that aircraft were all too often seen as an assisting arm of service, useful only for reconnaissance and communications.[36] Even he, however, writing of their use under his command in the largest assembly of airpower the Soviets had yet manage to assemble, wrote that:

> 'On the Western Front there was a real attempt at the massed use of aviation for decisive military goals. These attempts succeeded when the aviation operated separately. … when combined, cooperative activity of ground and air forces was required, things did not stick together and decisive results were not obtained.'[37]

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[34] Boyd, *Soviet Air Force*, pp. 10-11; Jones, 'Beginnings', pp. 27-29; Shishov, 'Sovershenstvovanie', pp. 33-34; Shumikin, *Sovetskaia voennaia aviatsiia*, p. 23. The repair and construction figures are from Shishov, who cites the journal *Samolet*, 11, 1937, p. 7 as his source, which may indicate extra caution should be taken with regard to these figures.

[35] Boyd, *Soviet Air Force*, pp. 10-11; Jones, 'Beginnings', pp. 27-29; Shishov, 'Sovershenstvovanie', pp. 33-34; Lapchinskii, 'Aviatsionnii 'Patriotizm'', p. 9, Lapchinskii, A. N., 'Uspekhi aviatsii na Zapade', (*Vestnik vozdushnogo flota*, 1, 1920, pp. 5-6), p. 6; Shumikin, *Sovetskaia voennaia aviatsiia*, p. 23, 70; Nevolin, 'Istrebiteli', p. 342-343; G. L., 'Itogi', p. 343.

[36] Tukhachevskii, 'Taktika aviatsii', p.92; G. L., 'Itogi', p. 344.

[37] Tukhachevskii, 'Taktika aviatsii', p.92.

Tukhachevskii's observation is no surprise, however, because most Army commanders had little idea of what aircraft were capable of, and tended to either ask the impossible, or expect the minimal – a situation apparently exploited on some occasions by both Air Force and Army commanders. Indeed, the lack of education showed up even on the pages of the Air Force's main journal, *Vestnik vozdushnogo flota* (*Air Force Herald*), which periodically contained articles that betrayed an author's complete incomprehension of aerial work – sometimes to provide the editors with an opportunity to shoot down the stranger ideas. For example, the most egregiously strange idea came in reply to an article by Lapchinskii, in which he described and praised the Clock Method for correcting artillery fire with reference to his experience as an observer/navigator during World War I. A reasonably incoherent article from one Vladimir Buze replied to point out the system's supposed failures. Lapchinskii, one of the journal's editors, replied with a comprehensive rebuttal, ending on the sarcastic note that, 'Despite the fact that I recommend the Clock Method, I cannot in good conscience claim that it can be used for the correction of fire on any target, when the observer can see only the firing battery, and not the target the battery is firing on.' - a point which Buze had claimed was a critical weakness of the Clock Method. The Field Directorate of Aviation slowly educated Army commanders about the Air Force, in part by ensuring that orders came to air units only from Army and Front level, and that the orders were phrased as general directives, leaving the air officers to ensure that the desired result was achieved. Nonetheless, even the latter situation was far from perfect. Cooperation between ground and air units was weak and bombing accuracy was poor enough to be labelled a 'sport' by Lapchinskii in 1920. In sum, much of the Soviet Air Force's energies in the Russian Civil War were spent keeping itself in the air under extremely difficult conditions. While theoretical works came out of the war years, they tended to be poorly connected to reality; as a 1940

Air Force manual stated, looking back over the Civil War experience, the 'sharp lack of aircraft prevented detailed study' of the conduct of tactical missions, let alone operational employment.[38]

The Civil War peaked in mid-1920 and wound down in early 1921, though bits and pieces sputtered on as the Soviets broke up a variety of peasant movements in 1920-1921, crushed the Kronshtadt revolt in March 1921, and tracked down various bands of Basmachi in Central Asia throughout the 1920s. Aircraft took some role in all of these actions, but in small numbers. Their usual function was reconnaissance, though some were used to bomb Kronshtadt, and there were several attempts to use aircraft for air-landings against Basmachi bands in the later 1920s. However, the Air Force as a whole faced other struggles.[39]

First and foremost stood the problem of survival given the fiscal limitations of the fledgling Soviet state and the desire for a militia military. The Air Force had powerful political support, including Lenin, Frunze, and Trotskii, who ensured that an Air Force of some sort would certainly exist. Even as the Army struggled with arguments over the transition to a militia system, there appears to have been little doubt that, as one commentator put it, 'an airplane is not a rifle, and storing it at home is difficult.'[40] Most understood that the Air Force was a technical arm, requiring skilled pilots and mechanics, and that those skills could only be attained and maintained through the constant practice only available with a full-time commitment to the job. Moreover, the Air Force was

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[38] *Voennoe Delo*, 1918-1920; *Voennaia nauka i revolutsiia*, 1921; *Vestnik vozdushnogo flota*, 1918-1921; Lapchinskii quote from Lapchinskii, 'Zametki o gruppovoi bombardirovke', (*Vestnik vozdushnogo flota*, 1-2, 1921, pp. 14-16), p. 14; 1940 manual quote: Smirnov, M. D., *Voiskovaia aviatsiia* (Moscow: Gosvoenizdat NKO SSSR, 1940), p. 24; Vl. Buze, 'Neskolko slov o, tak nazivaemom, Angliiskom sposobe korrektirovaniia strelbi', (*Vestnik vozdushnogo flota*, 3-4, 1920, pp. 22-23), a reply to Lapchinskii, A. N., 'Prosteishii sposob korrektirovaniia', (*Vestnik vozdushnogo flota*, 1, 1920), p. 42; Lapchinskii's reply: 'Otvet t. Buze na kritiku korrektirovaniia artilleriiskoi strelbi po sposobu chasov', *Vestnik vozdushnogo flota*, 1-2 (6-7), 1921, p. 17.

[39] A. Borisov, 'Desant v peski na samoletakh', (*Vestnik vozdushnogo flota*, 1, 1929, pp. 11-13); B. M. Zaretskii, A. G. Pervov, *Boevoe deistviia Sovetskoi aviatsii v lokalnikh konfliktakh i voinakh 1921-1941 gg.: Lektsiia*, (Monino, VVA, 1991).

[40] Chredin, 'Rol' aviatsii v militsionnoi armii', (*Vestnik vozdushnogo flota*, 1-2 (6-7), 1921, pp. 8-11), p. 11. It is worth noting that this was the *only* article to appear on this subject in *Vestnik vozdushnogo flota*.

assisted by the perception that, as a highly mechanical and technical arm, it was therefore inherently proletarian.[41]

Despite the support of key political figures and the mobilization of the press in its support, the biggest threat to the Air Force after the Civil War was the state budget, because of the expense of maintaining the Air Force's aircraft and personnel on a full-time basis. World War I and the Civil War left the Russian economy in ruins, and its industry in shambles. While defence was necessary, there was not a great deal of money available to generate the industrial base needed to maintain the Air Force in its current state, let alone build a large, powerful air force. Until the first Five Year Plan, funds for the aviation industry, and for the research and development of new aircraft, were limited. This is not to say that research and development, industrial expansion, and the purchase of new aircraft did not take place before the advent of the first Five Year Plan. They did, if slowly, and the Air Force was not starved of funds. In 1925, for example, its budget was 2% of the State Budget, or 10% of the overall military budget.[42]

The Soviet Air Force's numerical strength slowly rose, reaching 800 aircraft in line units and 725 in reserve in 1928.[43] The quality of the aircraft was beginning to rise as well as new designs began to be produced, with their first 'heavy' bomber, the TB-1, entering service in 1929 on the basis of the 1925 ANT-5.[44] Nonetheless, when the Soviets looked abroad, they were keenly aware that their Air Force was small compared

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[41] For examples of high-powered support of the air force, see: *V. I. Lenin i sovetskogo aviatsiia. Dokumenti, materiali, vospominaniia*, (Moscow: Voenizdat, 1979); Walter Jacobs, *Frunze: The Soviet Clausewitz, 1885-1925*, (The Hague: Martinus Nijhoff, 1969), pp. 122-123; L. D. Trotsky, *Aviatsiia – oruzhiie budushchego*, (Ekaterinburg, Uralkniga, 1923). pp. 91-163.

[42] Khripin, V, 'Voprosi strategii i taktiki Krasnogo Vozdushnogo flota (po povodu truda A. V. Sergeeva)', (*Vestnik vozdushnogo flota*, 8, 1925, pp. 5-8), p. 6.

[43] M. N. Tukhachevskii, Ed., *Budushchaia voina*, (RKKA Staff 4th Directorate, 1928), p. 404.

[44] Boyd, *Soviet Air Force*, pp. 26.

to those of the Western powers, and even, potentially, those of Poland and Romania, and this should be kept in mind when examining the doctrinal debates of the period.[45]

One important method of disseminating skills and ideas was the various state publishing houses. *Vestnik vozdushnogo flota* began publication in 1918. It covered all aspects of aviation, but usually with an Air Force slant; a significant proportion of every journal was concerned with military aviation affairs. As time went on this proportion increased, and by the later 1920s the explicitly civilian aviation content of the journal was normally small. The journal also carried extensive technical material on both domestic and foreign aircraft, book and journal reviews, and summary reports on the proceedings of various aviation societies. Backing up this effort was an outpouring of literature on aviation, ranging from small pamphlets intended to introduce the reader to the concept of aviation to books on topics related to military aviation. Here, too, the Soviets were kept acquainted with foreign work, as attested by a steady flow of western books on aviation published in translation. The impact of this material on Soviet theoreticians is difficult to judge; in their own works they rarely referred to western writers except Douhet, who by and large came in for sharp criticism. Clearly, given the availability of translated material from abroad, Soviet aviation theory did not develop in a vacuum. Equally, however, the Soviets clearly were not slavishly copying notions from abroad. Notions that fit well with their own were taken in, and those that did not were generally left aside. Moreover, the central tenets of Soviet airpower theory, concentration of force and supporting the ground forces, appeared very early and received little domestic challenge.[46]

Western influence may have been tangential because its focus tended to be different from that of Soviet theorists, a problem that has had its own effect in turn on western writing about the Soviet Air Force. Western writers have reflected this difference

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[45] M. N. Tukhachevskii, Ed., *Budushchaia voina*, (1928) and, passim, numerous articles in *Vestnik vozdushnogo flota*.
[46] *Vestnik vozdushnogo flota*, 1918-1928.

in focus by largely ignoring the topic of the Soviet Air Force's theory and doctrine, and the few who look at the topic tend to miss the point by searching for supporters of citybusting strategic bombing, reflecting the preoccupations of the West. Even the best work to deal with doctrine (and the only one to attempt to do so in any detail whatsoever), Alexander Boyd's *The Soviet Air Force Since 1918*, spends most of the chapter on pre-war Air Force strategy on the issue of heavy bombers in the 1930s. Another found strategic bombing advocacy where none existed. As will be seen in this chapter and the next, the Soviets harboured deep doubts about the value of strategic bombing. Attempting to see their doctrine through the lens of the Western emphasis on strategic airpower distorts our view. Soviet airpower theory developed along lines determined by its own conditions and along its own internal logic. Anglo-American focus on strategic, independent airpower developed not least because airpower in both the United Kingdom and the United States went through extended battles for its own independence, and because both nations faced no significant land frontier threat. In the Soviet Union, the issue of air power subordination followed very different lines because, just like the other continental powers, the Soviet Union could not ignore the strategic reality of a hostile land frontier. If the land army suffered defeat, the air force's airbases would promptly be overrun. The prevalence of the notion of the air force subordinating itself in large measure to the needs of the land forces was not a failure of imagination, but recognition of reality.[47]

Just as Soviet debates in the 1920s on the employment of the Army tended to fall into the camp of those who expected a 'peasant rear' with weak infrastructure and industrial resources, based on the real, existing Soviet Union, and those who based their

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[47] Boyd, *Soviet Air Force*, chapter 4; also chapters 1-3, 5-6 passim. Neil M. Heyman, in 'NEP and the Industrialization to 1928', (Higham & Kipp, *Soviet Aviation and Air Power*, pp. 35-46), claims, 'Lapchinsky, a noted air-power theoretician, openly promoted an important role for strategic bombing' (p. 41) – a statement I can find no evidence to back. Boyd's work is good but limited by the lack of source material available in the early 1970s, and focuses more on technology than doctrine.

ideas on a future Soviet Union whose industrial might had been awakened, the Air Force debates in the 1920s often contained, implicitly or explicitly, references to a 'small air force', such as the Soviet Union actually had, or a '[large] air force', such as they hoped to someday possess. Partisans of small air force theory could claim to be insisting on examination of the 'real possibilities' of the current situation, while the large air force partisans could point to the growing strength of Soviet industry and claim the future was theirs. This forms one of the two key divisions in Soviet thinking during the period up to 1928.

Similarly, there tended to be a parallel split between those who felt that predictions should be based on the current capabilities of aircraft, and those who thought the capabilities that were thought to be likely or possible in the future. Some of the speculation can seem rather fantastic to the modern eye, aware of the actual path of aviation technology development. However, the pace and direction of change was by no means obvious to observers at the time. Consider that this is written at the dawn of the 21st century, and that the F-15 is still one of the finest interceptors in the world after over 20 years in service. Twenty-four years elapsed from the Wright brothers' first fleeting flight in 1903 to Lindberg's trans-Atlantic flight in 1927. The pace of improvement of basic aviation technologies in that time was extraordinary, and we should perhaps forgive those at the time for feeling that pace might continue unabated, as indeed in some respects it did. The newest aircraft of 1926 were completely outclassed by the newest of 1936, which were in turn obsolescent compared to those coming on line in 1946. However fantastic some of the speculation over the future of aviation, the split between those who refused to speculate, and those who were willing to do so, paralleled the difference between those who insisted on remaining grounded in the reality of a small air force and those who looked towards a brighter future.

Thus Soviet theorists and planners faced a number of dilemmas about the use of airpower. Their air force was small, but many expected it to grow in the future. Their aircraft were often weak and unreliable in the present, but trending towards ever-greater power and capabilities year by year. This folded into arguments about the organizational structure of the Air Force. The three questions, of potential size, technological possibilities, and command structure, were all interrelated, and in turn were interwoven with the basic questions of the intended missions of the air force. Did reality restrict it to a set of small detachments for reconnaissance and artillery correction, commanded by corps and division commanders? Or should it look forward to a day of larger formations, commanded by higher commanders, at the army and front level, or indeed as a separate branch of service?

During the Civil War, most of the focus of Soviet writings was on practical matters of keeping aircraft flying and basics of their employment in combat, but some written work discussing theory did appear. One of the earliest articles on theory appeared in 1918; A. I. Kork[48], examining the role of aircraft in modern warfare, concluded that the modernization of aircraft meant that there was such a thing as aerial warfare, and that because of this and the specialized nature of aviation training and equipment, 'Military aviation… is a separate arm of service, equal to infantry, cavalry, artillery, and engineers.'[49] Therefore, just as those arms had their own specialist training and command structures, so should aviation. However, Kork apparently still felt that aviation was part of the army, noting that it was necessary to educate commanders of divisions and higher echelons in the use of aviation.

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[48] A leading Soviet officer, and commander of the 15th Army under Tukhachevskii during the drive on Warsaw in 1920, Kork eventually rose to command the Frunze Military Academy before falling alongside Tukhachevskii in the 1937 purges (John Erickson, *The Soviet High Command (3rd edition)*, London: Frank Cass, 2001), pp. 88, 202, 392, 463, 840.

[49] A. I. Kork, 'Rol' aviatsii v sovremennoi voine', (*Voennoe delo*, September 13, pp. 15-17), p. 17.

Somewhat more appeared in 1919, including the landmark 1919 *Nastavlenie po primeneniiu aviatsii na voine RKKA: Proekt* (*Regulations on the Employment of Aviation in War, RKKA: Project*). As noted before, it laid down the principle of concentration, which would become a cornerstone of the Soviet approach to air power.[50] Nonetheless, aviation's precise role was still in some doubt. Kork railed in 1918 at the Imperial Russian command for having seen aircraft as merely a form of reconnaissance and an adjunct to the cavalry, and the 1919 *Nastavlenie* included a range of tasks in its list of the basic missions of aviation – reconnaissance, artillery correction, signals, bombing and strafing, and air to air combat. However, the other articles and books published at the time concentrated on the reconnaissance and non-combat support roles of aircraft. Indeed, M. P. Stroev, the commander of the 1st Cavalry Army's air group during the Civil War and the author of numerous articles on the Air Force, wrote as late as 1930 that 'The signals service is *the fundamental mission of aviation during a [cavalry] raid*, standing in the first rank along with aerial reconnaissance.'[51] This focus on 'troop aviation', meaning those aircraft providing supported formations with reconnaissance, signals, transport, artillery correction, and perhaps a few fighters included for their defence, as opposed to 'combat aviation', meaning fighters and bombers in large formations, reflected the nature of the work that Russian and Soviet aviation was able to perform during the Civil War and World War I. Largely bereft of modern aircraft, and lacking large numbers of aircraft in any event, 'troop aviation' missions were within their power, while 'combat aviation' missions generally were not. Thus in 1920 Lapchinskii, a great supporter of the Air Force, labelled aviation a supporting arm in the Civil War, and another author, 'V. A.', noted that despite the exploits of the Ilya Muromets heavy bombers described in his

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50 *Nastavlenie po primeneniiu aviatsii*, 1919, p. 25, quoted in Shishov, 'Sovershenstvovanie', p. 33.

51 Kork, 'Rol' aviatsii', pp. 15-16; Pliachenko, 'Trudi po teorii', pp. 82-83, which briefly discusses N. A. Iatsuk's *Postanovka zadanii vozdushnogo razvedke*, (PU RVSR, 1919) and *Sluzhba aeroplanov pekhoti*, (PU RVSR, 1919); Shishov, 'Sovershenstvovanie', p. 29-31; quote on p. 31, from M. P. Stroev, *Aviatsiia i konnitsei*, (Moscow, 1930), p. 38; italics in original.

article, many Russian aviators were dubious of the value of heavy bombers, though V. A. did not explain why.[52]

Some voices were heard in favour of 'combat aviation' in the Civil War. Despite noting that the main missions of aviation were reconnaissance, observation, and signals, and recommending an aviation organization in which a ground army would command all of six fighters, an article by Teodori in 1920 declared the importance of air combat, recognizing that winning the air battle would allow friendly aviation to fly while preventing enemy aviation from performing its missions. If this provided a somewhat mixed message, the more vocal advocates of airpower were less reticent. Despite a variety of articles on the many problems of current practice, those looking towards the future expected aviation to grow into its boots.[53]

The Soviets soon articulated the need to mass airpower, which became one of the central tenets in their thinking on the use of the Air Force. As written by Lapchinskii in 1921:

> There is in aviation tactics steady growth of the concept of the necessity of massing aviation force on the main operational axis, even if, in the event of insufficient force, this means starving some secondary sectors of the front.[54]

Tukhachevskii argued that even a small air force needed to mass, in order to concentrate on gaining local victories instead of being defeated piecemeal across the front - a concept to which the Soviets would return in China, and again in 1941. Some made greater claims for airpower. Lapchinskii called aviation in the west 'a special form of a

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[52] Lapchinskii, 'Aviatsionnii 'patriotizm'', p. 10; V. A., 'Tiazhelaia aviatsiia', (*Vestnik vozdushnogo flota*, #3-4, 1920, pp. 12-13). Who V. A. might be is unclear.
[53] Teodori, 'Organizatsiia aviatsiia po opitu voini', (*Voennoe delo*, March 29, 1920, pp. 132-139); some of the articles highlighting problems include G. L., 'Itogi'; Lapchinskii, 'Avistsionnii 'patriotizm''; Lapchinskii, 'Uspekhi aviatsii na Zapade', (*Vestnik vozdushnogo flota*, #1, 1920, pp. 5-6); V. V. Khripin, 'O nedostatki primeneniia aviatsii na fronte', (*Vestnik vozdushnogo flota*, #1-2, 1921, pp. 6-7); Lapchinskii, 'Gruppovoi bombardirovke'; G-ko, 'Vnimatelnii vopros', (*Vestnik vozdushnogo flota*, #8-9, 1921, pp. 38-40); Tukhachevskii, 'Taktika aviatsii'; A. Neznamov, 'Strategicheskoe znachenie sovremennikh sredstv i boevaia podgotvka armii', (*Voennaia Nauka i Revolutsiia*, December, 1921, pp. 58-65); N. A. Iatsuk, 'Rabota aviatsii s konnitsei', (*Voennaia Mysl' i Revolustiia*, April, 1922, pp. 72-87).
[54] Lapchinskii, 'Gruppovoi bombardirovke', p. 14.

nation's armed forces, equal to the army and the navy' due to the amount of money spent on it, and noted the possibilities seen there for striking any type of ground or naval target, either independently or in conjunction with the army and navy.[55] He and N. A. Iatsuk[56] foresaw battles for ownership of the air, with Iatsuk staking out the more extreme position:

> Without mastery of the air, even having superiority on land, it is difficult to defeat the enemy, and if the strengths are even, it is impossible.... From this we conclude that no matter how the Army and Navy turn to the Air Force for cooperation in their operations in the beginning of a war, for strikes on lines of communications, bases, ships, etc., it is still correct, given the existence of a strong enemy air force, for the war to begin with a decisive strike upon it. Aviation's first step on the outbreak of war should thus be an aerial operation against enemy aviation. This operation must be well prepared and supported.[57]

While Iatsuk's position would eventually be borne out in World War II, nearly two decades later, it sat squarely in the realm of fantasy if applied to the small and struggling Soviet Air Force of the 1920s. A. Neznamov, *Voennaia Nauka i Revolutsiia*'s (*Military Science and Revolution*) in-house expert on the French and already a noted military theorist before the revolution, wrote an overview of the impact of new technology on strategy in the beginning of a 1921. Aviation received short shrift: he declared that it was unable to stop troop movements and unable to replace cavalry in the reconnaissance role, and would not be a major force until it either carried significant firepower, or was able to move powerful land forces into the enemy rear. Neznamov concluded his brief glance at aviation by stating, 'So far it has not possessed the basis to

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[55] Tukhachevskii, 'Taktika aviatsii', pp. 93-94; Lapchinskii, 'O vozdushnom flote na Zapade', *Vestnik vozdushnogo flota*, #1, 1921, pp. 247-248.
[56] N. A. Yatsuk, already a pilot before the First World War, was chosen to lead his unit after the revolution, swiftly rose to command of Glavvozdukhflota's (Main air fleet's) construction section, and headed the Tactics Department at the Air Force Academy from 1923 until his death in 1930 (Lapchinskii, 'N. A. Yatsuk', *Vestnik vozdushnogo flota*, 5, 1930, p. 36).
[57] N. A. Iatsuk, *O boevom znachenii sovremennoi aviatsii*, (Moscow: 1921), p. 23; quoted in Shishov, 'Sovershenstvovanie', p. 34.

even pretend to the title of 'a major arm of service'.' The rest of his article utterly ignored aircraft.[58]

Neznamov's and Iatsuk's positions represent the two extremes. Neznamov underrated the ability of the Soviet Air Force, though his views were more relevant to its current capabilities than was Iatsuk's vision of the future. Neznamov's position was based on an appraisal of current abilities, in a country whose economy, devastated after seven years of warfare, could not be expected to create many new or powerful aircraft in the near future. Others looked towards a time when technological improvements and industrial expansion would permit the fielding of a large, powerful force of aircraft. Iatsuk appears to have felt this lay just around the corner. His was an over-optimistic position, but his general hope was shared by many others, including Tukhachevskii and the generally level-headed Lapchinskii. However, there was little unity of views on the nature of the force that ought to be constructed. While the most accepted statement was the need to mass forces on the main axis, there was little agreement on what those forces were to be or what they would be doing. When the missions of the air force were discussed, the result tended to be a laundry list of everything that an airplane or group of aircraft might accomplish. The deeper questions of organization, of primary missions, and of the ability of aircraft to perform those missions, were unresolved at the end of the Civil War. After a reorganization in 1921-1923, and what appears to have been a 'time out' in 1922, evidenced by the general lack of articles or books on airpower theory, debate was renewed in 1923, where solidifying definitions evidenced both a growing common ground and a sharpening of the lines of debate.

In early 1923 A. N. Lapchinskii, among whose many hats was that of chief military aviation editor for *Vestnik vozdushnogo flota*, published an article in that journal on the nature of the Air Force. Significant sections of this article appear to have been a

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[58] A. Neznamov, 'Strategicheskoe znachenie', p. 59.

polemic against the views of M. P. Stroev, who was then the aviation editor for the General Staff's journal, then titled *Voennaia Mysl' i Revolutsiia.* Stroev's main worry appears to have been that air units not directly controlled by ground forces would cease to serve the interests of ground forces, and suggested that air unit boundaries ought to coincide with ground unit boundaries in order to ensure that ground forces got the support they needed. By support, it appears he meant primarily reconnaissance and artillery correction, because Lapchinskii attacked Stroev for underestimating the throw-weights of bomber units, even when assuming 25%-33% of the unit was not flying. Lapchinskii's reply to the worry of lack of support for ground forces was that the Air Force needed to work in mass, especially given the numerical inferiority of the Soviet Air Force. Only by keeping the air units independent of the ground command would they be mobile and able to concentrate as needed. Concentrated on the main operational axis, their mass would enable them to try to gain at least temporary mastery of the air, despite their numerical weakness, and therefore they could fulfil their support tasks - also concentrated.[59]

Stroev seems to have spoken for a number of people whose understanding of aviation was weak, as amply demonstrated by some of his published articles, which, alongside some valid points, include such gems of insight as,

> The speed of modern racing aircraft has reached the limits which are considered lethal in shrapnel. To accomplish reconnaissance at such velocities is unthinkable, and thus reconnaissance aircraft must slow down…
>
> Aviation is a technological weapon of social revolution, called into life by the growth of that idea. As such, it, speaking a priori, cannot influence the actions of troops into directions opposing their general tendency.[60]

However, of greater interest than the points of conflict are the main lines of agreement. Both agreed that the fundamental mission of the Air Force was to support the ground forces. They disagreed on the necessary directness of that support, but it appears

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[59] A. N. Lapchinskii, 'Predrassudki v taktiki aviatsii', (*Vestnik vozdushnogo flota*, #1, 1923, pp. 9-13).
[60] M. Stroev, 'Rol' aviatsii v vopros taktiki budushe', (*Voennaia Mysl' i Revolutsiia*, June, 1923, pp. 136-154), quotes from p. 137 and p. 142.

that the need for that support – at some level – was not in doubt. This did not preclude disagreement on how to organize that support, who should call for it, and exactly what form it was to take.

By 1924, the New Economic Policy was revitalizing the Soviet economy, and it was becoming apparent that the Soviet Air Force would not remain forever a tiny air force, but would grow to be at least a small one; while 23 aircraft were built in 1922-1923, 264 were built in 1924-1925.[61] Since it would clearly be possible to field more than a few outdated reconnaissance aircraft to each Army, the debates on the organizational place of the air force – subordinate to the army, or parallel to it? – intensified in 1923-1924. It had existed earlier, but with a war to fight, and then the numbers of aircraft small and the budget equally so, it appears to have been less of an issue. The renewed debate appears to have kicked off in a speech by the Chief of Staff of the Air Force, S. A. Mezheninov[62], at a conference in August 1923. In addition to less contentious pronouncements, such as that the Air Force should appear 'where the fate of the operation is decided', he also declared that the rapid growth of the Air Force was leading to its being a 'separate military force', equal to the Army and the Navy.[63]

As in the debate on lower levels of command, at first glance the battle line appears in the journals as M. P. Stroev in *Voennaia mysl' i revoliutsiia* vs. *Vestnik vozdushnogo flota*, in which Lapchinskii wrote articles blasting at Stroev. Stroev wrote a long article against N. A. Iatsuk's proposition that the Air Force was fully qualified as a separate service. However, the lines were messier than they at first appear. Stroev's polemic at Iatsuk, after much confusion, ended up concluding that the Air Force is in fact a separate

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[61] Vershinin, K., 'Voenno-vozdushnie sili', (*Voenno-Istoricheskii Zhurnal*, 9, 1967, pp. 27-39), p. 30.
[62] Trained as an observer-navigator and a graduate of the Tsarist General Staff Academy, S. A. Mezheninov overcame his noble birth with a highly successful career in the Soviet military. He rose to be one of Yegorov's Deputy Chiefs of Staff of the Red Army, with unfortunate consequences in the purge. (Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 108-109; Erickson, Soviet High Command, pp. 388, 847.)
[63] Migulin, V. I., *Teoriia i praktika primeneniia sovetskikh VVS v mezhvoennii period (1921 - 1941 gg.) Uchebnoe posobie*, (Moscow: Voenno-Politicheskaia Akademiia, kafedra istorii voennogo iskusstva, 1988), p. 23-24.

element, but one that must be subordinate to the Army at the operational level, since only in the battle for command of the air would the Air Force be truly independent. Lapchinskii and Iatsuk, while arguing for centralized command of the Air Force, also argued against the notion of independent bomber forces winning the war: the western debate was not mirrored here. Other articles provided further nuance to this debate. An article by V. Khripin[64] took Aleksandr Svechin to task for suggesting in a speech that combined arms commanders must learn the skills of their support arms, instead of relying on the assigned specialists for their expertise. Yet A. Gotovtsev, S. Khorkov[65], and A. N. Lapchinskii all worried about the lack of coordination between ground and air forces in the training and manoeuvres they ran; the complaints were best summarized by Gotovtsev, who wrote of a set of manoeuvres in 1924 that the air staffs on each side

> *independently* work out operational-tactical questions of the actions of combat aviation, *independently* analyze the situation, *independently* set missions and fulfill them, *independently* write reports, *independently* verify, criticize, and study better approaches.[66]

Combined with a number of complaints that cooperation between air units and ground units was stressed in theory but ignored in practice, it appears that the debate on the overall organization of the air force – as a separate service, or organic within the army? – was linked to the debate, discussed earlier, on its operational subordination and the effectiveness of its support to ground troops. In the wider picture, the link between theory and practice proved a frequent point of failure for the Soviet military in the inter-war years, with generally sound theory poorly reflected in frequently shoddy practice that

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[64] A prolific writer on Soviet air force affairs and heavy aviation expert, Vasilii Vladimirovich Khripin served as an army's air group commander in the Civil War. A protégé of Ya. I. Alksnis, he rose to be Chief of Staff of the Soviet Air Force, then commanded a Special Purpose Air Group [AON] of heavy bombers before falling along with his patron in the purge. (Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 159. 161, 187, 188; *Voprosi strategii I operativnogo iskusstva v Sovetskikh voennikh trudakh 1917-1940 gg.*, p. 648.)

[65] Another prolific writer, S. G. Khorkov commanded various air units in the Civil War and commanded the Zhukovskii Air Force Academy from 1925 until 1934. ((Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 119, 167.)

[66] A. Gotovtsev, 'Opit metodiki polevoi raboti slushateli Voennoe Akademii RKKA s aviatsiei (aviaotriad 'Ultimatum') letom 1924 g.', (*Vestnik vozdushnogo flota*, 11, 1924, pp. 12-16): p. 12. Italics in original.

reports on maneuvers repeatedly bewailed, and for which troops eventually paid in blood.[67]

The link between these debates was the dichotomy between the two 'primary roles' seen for the Air Force: air superiority and ground support. While not a hotly debated topic, A. Kozhevnikov[68] argued in 1923 that ground support was in fact the second mission of the air force – the primary mission being to destroy the enemy air force: 'The duty of Red Aviation will be to force the aerial enemy to temporarily cease flying over our territory at a moment necessary to us.'[69] The main thrust of this article was supporting a move from aviagruppi (airgroups) with a highly variable content to eskadrili (squadrons) with a known organization in order to ease logistics, a shift completed in practice by the end of 1924. However, it also demonstrates that concentration of force and support for ground forces were seen as central tenets to be challenged.[70]

Other authors also referred to this question of the Air Force's primary mission, and at times the debate seems largely semantic, given the underlying consensus that both missions needed to be accomplished, the aim of air superiority being to ensure support to the ground forces. However, the question loops back into the issue of higher

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[67] Gotovtsev, 'Opit metodiki', (*Vestnik vozdushnogo flota*, 11, 1924); A. Gotovtsev, 'Opit metodiki polevoi raboti slushateli Voennoe Akademii RKKA s aviatsiei letom 1924 g. (dvukhstoronnaia voennaia igra v pole)', (*Vestnik vozdushnogo flota*, 12, 1924, pp. 7-12); 'Postoiannaia Voenno-nauchnaia komissiia Shtaba RKKA Vozdushnogo flota: N. A. Iatsuk, 'Kakie nam nuzhni aeroplani?'', (*Vestnik vozdushnogo flota*, 1, 1923, pp. 106-108); A. Lapchinskii, 'Otvet retsenzentu zhurnala 'Voennaia Mysl' i Revolutsiia' tov. Stroevu', (*Vestnik vozdushnogo flota*, 1, 1924, pp. 14-15); Khripin, 'O 'samoderzhavi' i 'konstitutsionnom pravlenii'', (*Vestnik vozdushnogo flota*, 2, 1924, pp. 13-14); A. Lapchinskii, 'K voprosu o voiskovoi aviatsii', (*Vestnik vozdushnogo flota*, 3, 1924, pp. 15-16); N. Iatsuk, 'Taktika malikh flotov morskogo i vozdushnogo', (*Vestnik vozdushnogo flota*, 6-7, 1924, pp. 1-5); S. Khorkov, 'Osnovnie printsipi letnoi raboti', (*Vestnik vozdushnogo flota*, 12, 1924, pp. 3-4); M. Stroev, 'Vozdushnii flot, kak element vooruzhennoi sili', (*Voenaia Mysl' i Revolutsiia*, March, 1924, pp. 150-162); Migulin, *Teoriia i praktika*, p. 24; Anuchin., V. V., Zdorov, O. N., 'Zarozhdeniie i razvitie teorii boevogo primeneniia VVS (1917- 1938 gg.)', (*Voenno-Istoricheskii Zhurnal*, 8, 1988, pp. 19-26), p. 19.

[68] A. T. Kozhevnikov commanded an air unit in the Civil War, taught at the Zhukovskii Air Force Academy, then rose to Chief of the Air Force in the Belorussian Military District in 1932, where his 'combat experience and deep theoretical knowledge' ensured his success. Very probably shot in 1937. (Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 41, 128, 161.)

[69] A. Kozhevnikov, 'Organizatsionnie voprosi', (*Vestnik vozdushnogo flota*, 3, 1923, pp. 4-7), quote p. 4.

[70] Kozhevnikov, 'Organizatsionnie voprosi'; Vershinin, 'Voenno-vozdushnie sili', p. 30.

organization. The arguments noted earlier about concentration reflect this debate over the primary mission of the air force, as the needs of an air superiority campaign are eased by the subordination of the air force to a higher level of ground command or indeed a complete independence, while direct subordination to a tactical unit to provides that unit with better support.

The disagreement on the issue of the Air Force's primary mission is part of the reason that A. V. Sergeev's *Strategiia i taktika Krasnogo vozdushnogo flota* (*Strategy and Tactics of the Red Air Force*)[71], published in 1925, was hotly debated. As Chief of Staff of the Air Force from 1918-1922, Sergeev's opinion carried weight. However, despite a favourable introduction written by Lapchinskii, noting that Sergeev had avoided the common problems of being insufficiently informed about aircraft and their military history, the book met a hot reception from reviewers. Sergeev's conclusions were in fact carefully argued and considered but touched on a wide number of points. Cardinal among them was his conviction that the Air Force existed to support the others:

> There is no aerial strategy, because there is only one strategy. The Air Force is a means of strategy. The entire strategy of the Air Force boils down to assisting the Army and the Navy, whose actions alone give us victory or defeat in war.[72]

However, because of his definition of air superiority, 'Mastery of the air exists when one side is free, relative to the other, in conducting its fundamental activity: reconnaissance. Mastery of the air can only be relative....[73]', Sergeev supported a complete, separate command structure for the Air Force, as this alone would give it the necessary flexibility to mass, gain air superiority, and support the Army or Navy at the decisive point.[74] He concluded with a plea for increased production, clinching the argument by demonstrating

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[71] A. V. Sergeev, *Strategiia i taktika Krasnogo vozdushnogo flota*, (Moscow: Vestnik Vozdushnogo Sila, 1925). In addition to serving as Chief of the Air Staff, Sergeev had been a Bolshevik since 1911, a combat pilot from 1916, and helped storm the Winter Palace (Shumikin, *Sovetskaia voennaia aviatsiia, 1917 - 1941*, p. 39).

[72] Sergeev, *Strategiia i taktika*, p. 31; reiterated in similar words on p. 41.

[73] Sergeev, *Strategiia i taktika*, p. 43.

[74] Sergeev, *Strategiia i taktika*, chapter 6.

the necessity of large numbers of aircraft in war with a large chart tracing the month-by-month strength of an air force in several sectors of combat over the course of a year, including average loss rates, replacements from industry, repairs minor and major, commitment of pre-war reserves, and breakdown rates.[75]

Sergeev refused to extrapolate beyond the current, small, capabilities of the Red Air Force. Despite recommending a separate command structure, he refused to consider it an equal to the Army and Navy, repeatedly stating that its primary capability was reconnaissance. This met a harsh reaction from his first reviewer, who noted that Sergeev's conclusions were only valid given the current state of the Air Force, failed to take into consideration even the most likely future developments, and 'fails to set out any real rights of the Air Force in the overall sum of budget outlays' – an interesting comment which suggests there may have been more worry on this point than is otherwise apparent. Nonetheless, the reviewer concluded on a brighter note, stating that Sergeev's book would reward attentive reading.[76]

The longest response came from Khripin, whose article discussing the book's conclusions spread over two issues of *Vestnik vozdushnogo flota*. Khripin noted two tendencies of thought about the air force: as an assistant force, and as a third element of the military overall. Sergeev fell squarely into the 'assistant' camp, stating that 'Objectively, the Air Force has no independent missions', a position with Khripin labelled one of 'deep pessimism'.[77] While Khripin agreed with Sergeev that the air force was not, in 1925, a third element of the military, he also accused him of failing to keep up with developments since the Civil War; the Soviet Union was no longer especially poor, and

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[75] Sergeev, *Strategiia i taktika*, p. 211.
[76] A. Snesarev, 'A. V. Sergeev. *Krasnogo vozdushnogo flota*, Moscow: 1925 g.', (*Vestnik vozdushnogo flota*, 7, 1925, pp. 61-62).
[77] V. Khripin, 'Voprosi strategii i taktiki Krasnogo Vozdushnogo Flota (po povodu truda A. V. Sergeeva)'. (*Vestnik vozdushnogo flota*, 8, 1925, pp. 5-8), p. 5; Sergeev quote originally from Sergeev, *Strategiia i taktika*, p. 28.

just as the army needed automobiles and machine guns, and would get them, it needed an air force overhead doing more than reconnaissance, and should get it. Furthermore, the air force should study not only its current situation and how to deal with it, but the expected future in which greater numbers would make it possible to gain not only temporary, but possibly complete air superiority. Thus, Khripin continued, the air force did have a strategy, which covered questions of preparing the air force and the country for aerial warfare, of the overall control of the air force, of conducting independent operations, and of conducting operations in cooperation with the army and navy. While Sergeev was unimpressed by the bombers of 1925, Khripin advocated heavy bombers able to destroy major enemy targets. Sergeev suggested expanding the aircraft industry – particularly the aircraft engine industry – in order to build 1000-1200 aircraft over the next 3 to 5 years, but then expected all of these to serve in roles such as reconnaissance, signals, and artillery correction in air units organic to ground force corps. Khripin was unimpressed by both the intended use of these aircraft and by their numbers, expecting that in the event of a war the enemy would be backed by thousands of aircraft provided by the West. In short, Sergeev based his arguments on what the Air Force was able to do in 1925, while Khripin wanted works of theory to concentrate on what the Air Force would be able to do once a major building program came into being.[78]

Not all the reviews of Sergeev's book were disapproving; another review praised it on most counts, especially its call to subordinate all Air Force units to Army units.[79] Nonetheless, it provided a focus for debate because it touched on all the various strands and tried to bring them together. The size of the Air Force and the abilities of its aircraft directly influenced what missions it could be expected to accomplish and who should

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[78] Khripin, 'Voprosi', (*Vestnik vozdushnogo flota*, 8, 1925); V. Khripin, 'Voprosi strategii i taktiki Krasnogo Vozdushnogo Flota (po povodu truda A. V. Sergeeva) (okonchanie)', (*Vestnik vozdushnogo flota*, 10, 1925, pp. 11-14).

[79] A. Grigorev, 'Kolichestvo i kachestvo (Po povodu knigi tov. A. V. Sergeeva *Strategiia i taktika Krasnogo Vozdushnogo Flota*)', (*Vestnik vozdushnogo flota*, 10, 1925, pp. 14-16).

command it. Those who expected little of aircraft tended to assign them to a smaller role; those who expected more of aircraft, and more aircraft from industry, tended to assign them a larger place in the military firmament.

An attempt at synthesizing these problems that met with far less furor appeared in 1926. As in his other works, A. N. Lapchinskii's long experience in teaching showed in the clarity of exposition in *Taktika aviatsii* (*Aviation Tactics*)[80]. This skill probably helped *Taktika aviatsii* avoid controversy – and win the Frunze Prize for 1926[81] – as it enabled him to present ideas which, while often similar to Sergeev's, were better received since it was easier to follow both the logic of his argument and the nuances of the conclusions he presented. Lapchinskii carefully differentiated between conclusions based on a theoretical ideal from those based on practical considerations of current reality, enabling him to present both sides of the argument without conflating them.

Thus, in Lapchinskii's ideal case an air force could conduct independent activity against an enemy air force, and also both cooperative and separate activity against enemy land and naval forces. Wide-ranging and fast-moving, the air force could act en masse for observation, cover, reconnaissance, and to 'continue the work of artillery into the depths'.[82] On the other hand, he also noted that the impact of the air force was often mostly on morale – 'The air force, like lightning, brings danger to few and fear to all'[83] – and furthermore, its mobility and activity was restricted by weather, maintenance difficulties, pilot training, and the immobility of its bases. In theory, the air force was one of the three elements of military power. In practice, he wrote, no air force anywhere had conducted an independent operation of any value, and thus the air force had only proven itself as a branch of the other two services. Lapchinskii suggested that the synthesis of

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[80] A. N. Lapchinskii, *Taktika aviatsii*, (Moscow: Avioizdatel'stvo, 1926).
[81] Pliachenko, 'Trudi po teorii', p. 86.
[82] Lapchinskii, *Taktika aviatsii*, p. 7-11; quote from p. 10.
[83] Lapchinskii, *Taktika aviatsii*, p. 11.

these theses lay in production: once industry was able to supply enough aircraft for the air force to be capable of fulfilling independent missions, it would properly attain a status equal to the army and the navy.[84]

In discussing the roles the air force could play, Lapchinskii introduced terminology for a three-way split to typify the general nature of missions: independent (nezavisimii), separate (samostoiatelnii), and service (sluzhatelnii). *Taktika aviatsii* appaeared in three editions, and Lapchinskii's terms entered standard use in the 1920s and 1930s, though other theorists tended to adjust the boundaries of the definitions to suit their points of view. However, Lapchinskii's definitions remained the central point of the spread of definition. Independent missions would have at most an indirect impact on the battlefield, such as a campaign of bombing factories or to gain air superiority. Separate missions would have a direct impact on the battlefield, but were conducted by air units not organic to frontline combat units (though very likely subordinated, temporarily, to an Army or Front) – a category that included both air interdiction and close air support. Reconnaissance conducted on behalf of the army, signals, transport, and the like constituted service missions. Lapchinskii stated that only a large air force had the strength to conduct independent operations; a small air force could only conduct separate and service operations, although included in the separate operation might be an element tasked with gaining air superiority for a defined period of time over a defined space.[85]

From this Lapchinskii concluded that air units on service missions should be directly subordinate to the army and the army commanders needed to be familiar with the abilities of their air units; thus those air units should be organic to their army, or, sometimes, their corps or even division. However, the large fighter and bomber units that Lapchinskii hoped would eventually exist should be in their own command structure, in

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[84] Lapchinskii, *Taktika aviatsii*, p. 9-16.
[85] Lapchinskii, *Taktika aviatsii*, p. 13-21.

order to enable them to mass freely. When massed on a given Front (a Soviet army group), they were to be under the operational control of the ground force commander. These aviation forces would act in the overall interests of the ground forces on that front: some of the missions conducted might not be direct support at the front, but the sum of the activity of a Front's air force should directly support goals of the Front's ground forces.[86]

Taktika aviatsii's synthesis did not put debate to rest. However, it highlighted the topics of many of the debates – including the continuing debate over command subordination - while also taking part in a growing discussion of air superiority, operational art, and, more indirectly, the role of an air force in the initial period of war. While the concept was being discussed under a number of names, 'operational art', a term coined by Svechin for a series of lectures in 1923-1924[87], was becoming standard in the vocabulary of military writers by 1925 and became increasingly common after 1926 when his book *Strategy* was published. Within the next ten years this new concept would help redefine the Soviet approach to warfare. Its overt part in the Air Force debate was still small, but the references to it were growing, and the attitudes it fostered were beginning to show in other major discussions: of air superiority, the role of the Air Force in the initial period of war, and command subordination.

Air superiority had been mentioned, in some manner, since the beginning of the Soviet Air Force. The Soviets wrestled with terminology for this concept, then still quite new. They used neither of the current Western terms, of offensive counter-air (OCA) for operations aimed at the destruction or suppression of the enemy air force and defensive counter-air (DCA) for operations aimed at protecting friendly forces from enemy air

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[86] Lapchinskii, *Taktika aviatsii*, p. 22-24, 147-149, 157-158, 229-233.
[87] Jacob Kipp, 'General-Major A. A. Svechin and Modern Warfare: Military History and Military Theory', (Aleksandr A. Svechin, *Strategy*, trans. Kent Lee, Minneapolis: East View Press, 1991; originally published Moscow: Voennii Vestnik, 1926; Kipp's introduction pp. 23-56), pp. 37-38.

activity. During the 1920s, 'prevoskhodstvo v vozdukhe' (superiority in the air), and 'gospodstvo v vozdukhe' (mastery of the air) proved the most common terms, with the latter gaining ascendancy in the 1930s. However, the distinctions between the translations of the terms are not as important as the ideas behind them. In the early years authors tended to refer instead to the importance of aerial combat. They rather more rarely linked this into a wider framework, as a 1920 article which noted that air combat's importance lay in winning freedom of flight for one's own side while preventing enemy flight.[88] The concept of air superiority existed, albeit perhaps without clear definition, when Iatsuk wrote in 1921 that it was necessary[89]; but there appears to have been little early discussion of the topic, and the 1924 *Vremennoe nastavlenie po primeneniiu Vozdushnikh Sil SSSR* (*Temporary Regulations on the Employment of the Air Force of the USSR*) promulgated the mildly surreal notion that air superiority constituted a form of suppression of enemy morale.[90] In 1925, Sergeev wrote that air superiority was a measure of the freedom of one side or the other to conduct its reconnaissance[91], but this definition was not generally accepted. Some authors seem to have been uncertain how to define it. For example, Shamilo wrote in 1925 that air superiority would only exist at defined moments and places, but in 1926 quoted with approval the *Temporary Air Force Regulations*, 'Mastery of the air will belong to the side than can force the other to defend its rear.'[92] Shamilo's 1925 concept, however, was gaining currency. In a surprisingly coherent article, Stroev wrote in 1925 that

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[88] Teodori, 'Organizatsiia aviatsiia po opitu voinu', (*Voennoe delo*, March 29, 1920, pp. 132-139), p. 134-135.
[89] N. Iatsuk, *O boevom znachenii sovremennoi aviatsii*, (Moscow: 1921), p. 23; quoted in Shishov, 'Sovershenstvovanie', p. 34.
[90] Anuchin, V. V., Zdorov, O. N., 'Zarozhdeniie i razvitie teorii boevogo primeneniie VVS (1917 – 1938 gg.)', (*Voenno-Istoricheskii Zhurnal*, 8, 1988, pp. 19-26), p. 21. The regulation itself is *Vremenoe nastavlenie po primeneniiu Vozdushnikh Sil SSSR*, (Moscow: Gosvoenizdat, 1924).
[91] Sergeev, *Strategiia i taktika*, p. 43.
[92] Shamilo, 'Odnomestnie ili dvukhmestnie istrebiteli?', (*Vestnik vozdushnogo flota*, 2, 1925, pp. 24-26), p. 24; Shamilo, M., 'Vozdushnaia oborona', (*Vestnik vozdushnogo flota*, 6, 1926, pp. 1-6), p. 6; quote cited by

> If we surprise [the enemy] with a concentration of superior aerial forces at the point of the decisive ground blow, their superiority will be, firstly, conditional, and, secondly, of very short duration; the latter is explained by the enemy's ability to swiftly shift aerial strength to the threatened point from neighbouring areas.
>
> More or less prolonged superiority, necessary in view of the prolonged character of modern combat, can only be gained in the event of the aerial enemy already being suppressed in an aerial operation: *from this we draw the conclusion that the decisive operations of the Air Force do not coincide with the decisive operations of the ground forces, but precede them.*
>
> In the critical moment for the ground forces, aviation, although working at maximum intensity, in significant measure only exploits its [the Air Force's] earlier success or bewails its prior failure – in the latter instance, appearing only cautiously on the field of battle, where the victorious aerial enemy acts relatively freely.[93]

Stroev, like many writing before him, considered the fighter aircraft to be the source of air superiority. S. Mezheninov challenged this a year later, pointing out that all classes of aircraft, fighter, bombers, and reconnaissance, had a role to play in the fight, arguing that the best results came not from patrolling, but from aggressively attacking enemy airfields, though he conceded this had produced poor results from this in World War I.[94] However, the issue of whether to begin the air superiority operation before or concurrently with the opening of the ground offensive remained an issue of contention. Stroev considered it better to attain air superiority before the main attack, in order to provide maximum air support during the offensive, than to launch the air superiority battle during the opening stages of the offensive and thus possibly delaying the provision of air support, even though this might well give away the axis of the ground offensive.[95] This issue remained a bone of contention until the second half of the Second World War, when Soviet superiority became great enough to permit them to launch the air superiority operation simultaneously with support of the ground offensive without starving either of combat power.

Shamilo as from page 25 of *Vr. Nastavlenie VVS*; no year (or full citation) provided but this is probably not the 1924 edition. [I do not know who Shamilo might have been apart from the evidence of his writings.]

[93] M. Stroev, 'Ocherki frontovoi organizatsii upravlenii vozdushnim flotom', (*Vestnik vozdushnogo flota*, 3, 1925, pp. 5-8), p. 6. Italics in original.

[94] S. Mezheninov, 'Zametki o gospodstve v vozdukhe i istrebiteliakh', (*Vestnik vozdushnogo flota*, 8, 1925, pp. 3-5), p. 3-5.

[95] Stroev, 'Ocherki', p. 6-7.

In the 1920s, however, such strategic superiority remained at best a pipe dream. Therefore the debate of when to begin an air superiority operation was part and parcel of the debate on command subordination. Stroev's answer to this was twofold. On the one hand, the air commander was to be completely subordinate to the ground commander, who would be choosing the time, place, and intent of the attack. On the other hand, the ground commander was to give the air commander the freedom to support those goals as the air commander saw fit. The ground commander was not to interfere with the air superiority battle at all, that being outside his purview, but in the main offensive the air force's actions were to be determined largely by the ground commander, who would specify the time, location, and desired intensity of air support. Overall Stroev suggested that the air force should have its own command structure for training and supply, but be subordinate to Army and Front commanders operationally. He recommended that this subordination be long-term in order to facilitate good cooperation between these units. In effect, each Front would have its own air force, an organization theoretically in place in June 1941 and deployed to excellent effect in a more sophisticated form by A. A. Novikov in 1942.[96]

These concepts were not undisputed. B. Lazarev replied, to Stroev's commentary quoted above, that it would be wrong at that time to make the rest of the armed forces conform to the Air Force's wishes, since the Air Force was yet weak, and therefore could not make enough of a difference to demand, say, that the Army keep its fingers out of the air superiority battle. Overall Lazarev agreed with Stroev's main points; writing that it was especially important for a small Air Force to mass, and for it to expect to gain air superiority for only a limited space and time, those being determined by the places and

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[96] Stroev, 'Ocherki', p. 6-8; M. Stroev, 'Ocherki frontovoi organizatsii upravlenii vozdushnim flotom (okonchanie)', (*Vestnik vozdushnogo flota*, 4, 1925, pp. 8-10), pp. 8-10. Regarding organization: Migulin, *Teoriia i praktika*, p. 108.

times the Army was most in need of support.[97] A year later, A. Algazin[98], writing on operational planning for the air force, noted that air superiority did not define a mission:

> Ordering someone to gain air superiority is the same as ordering someone to win. The concept of air superiority does not define operational missions.[99]

However, by 1927-1928, a basic concept of air superiority had been accepted. Thus various articles in 1927 noted that air superiority could be achieved only through both air combat and strikes on enemy airbases and that air superiority was a tactical and very temporary condition, while Lapchinskii, commenting on Western theories of airpower, commented that the Western notion of air superiority as putting the enemy air force on the defensive was meaningless.[100] 1928 saw even less debate. Another article by Lapchinskii noted that Douhet's definition of air superiority – 'To master the air means to be able to prevent the enemy from flying while retaining the ability to do so' – had proven quite difficult to put into practice in reality, and therefore it was generally accepted that air superiority could only be gained at a given time and space, most often by massed fighter aviation at the point where superiority was needed.[101] This did not mean the Soviets saw air superiority as pointless; it meant they believed that total air superiority, in which the other side was prevented from flying to any significant degree, was probably impossible. Assuming both sides would be able to reinforce air units indefinitely, they therefore concentrated on the more achievable goal of wresting freedom

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[97] B. Lazarev, 'K state 'Ocherki frontovoi organizatsii upravlenii vozdushnim flotom' t. Stroevom (VVF 3/1925)', (*Vestnik vozdushnogo flota*, 7, 1925, pp. 13-16), p. 13.

[98] Aleksei Sergeevich Algazin joined the Soviet military in 1925, serving as Chief of Staff in an aviation brigade, a term on the editorial board of *Vestnik vozdushnogo flota*, and Chief of the Department of Operational Art at the Zhukovskii Air Force Academy; shot in 1937. (*Voprosi strategii I operativnogo iskusstva v Sovetskikh voennikh trudakh 1917-1940 gg.*, p. 660.)

[99] A. Algazin, 'Voprosi upravleniia vozdushnim silami', (*Vestnik vozdushnogo flota*, 10, 1926, pp. 5-9), p. 7.

[100] V. Malkin, 'Deistviia aviatsii v borbe za gospodstvo v vozdukhe', (*Vestnik vozdushnogo flota*, 4, 1927, pp. 12-15), p. 12; I. Pavlov, 'K operativnomu ispolzovaniu boevoi aviatsii (iz polevoi knizhki)`, (*Vestnik vozdushnogo flota*, 1, 1927, pp. 10-13), p. 11; A. Lapchinskii, 'Zarubezhnie tendentsii v primenenii istrebitelei`, (*Vestnik vozdushnogo flota*, 4, 1927, pp. 6-11), p. 9.

[101] A. Lapchinskii, `Aviatsiia na polem srazheniia`, (*Voina i revolutsiia*, November, 1928, pp. 141-152), pp. 143-148.

of action for themselves, and denying it to the enemy, at defined spaces and times of their choosing.

Two wider issues come out of the issue of air superiority. The first is, yet again, that of command subordination. The air superiority battle was clearly a battle the air force would have to fight on its own, and thus was a ready-made case for the air force commanding its own units without subordination to ground forces. However, all commentators accepted that air superiority was not a goal in itself, but was only useful in the context of enabling the air force to accomplish missions in support of ground force operations. The latter suggested the need for subordination to ground force commanders. Algazin's suggested solution to this dilemma was that while situation on the ground was the primary factor defining the timing and extent of the mission, the air force nonetheless should in no way be subordinate to any ground force commander below the Army level. The only dissenting opinion to appear reads more like an affirmation of Algazin's position than a rejection of it.[102] However, none of these authors provided any concrete plan for achieving air superiority beyond the notion that it would be necessary to mass fighters and bombers for the operation.

Having tied the battle for air superiority to the army's decisions on where and when the main effort would be, some went looking for opportunities for the air force to act on its own initiative. They found two instances of this: in the bombing of the enemy's deep rear, and in the initial period of war.

Despite initial doubts about the value of heavy bombers, early dismissal of bombing influencing political centres as 'slogans', and the use of the name of the World War One Ilya Muromets squadron's commander as an insult, the Soviets retained an active interest in heavy bombers. Their first Heavy Bomber Brigade began formation in

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[102] A. Algazin, 'Voprosi upravleniia vozdushnimi silami', (*Vestnik vozdushnogo flota*, 10, 1926, pp. 5-9), p. 8; A. Grigoriev, 'Ob operativnom upravleniie aviatsii (Otvet t. Algazinu na statiu 'Voprosi upravleniia vozdushnimi silami')', (*Vestnik vozdushnogo flota*, 11, 1926, pp. 3-4).

1926, and they also embarked on heavy bomber development, as evidenced by the deployment of the TB-1 in 1929 and the appearance of the TB-3 in 1930.[103] Despite a generally negative attitude towards deep strikes on enemy cities and industry, the notion did receive some discussion. The primary supporter of such activity in the 1920s appears to have been S. Mezheninov, who wrote in 1926 and 1927 of the need for the Long Range Aviation units to strike at enemy industrial and population centers during mobilization, possibly as part of a fully independent Air Army, with the objective of acting as 'heavy super-long-range aerial artillery' to disrupt the enemy's operations or campaigns in a given area. However, even Mezheninov considered the Soviet Air Force too weak in the 1920s to carry out such an operation, and his intent was much closer to air interdiction than a strategic bombing campaign.[104] In addition, Captain Martin Fiebig, sent from Germany to teach at the Soviet's Zhukovskii Air Academy in 1924, was unimpressed by his student's insistence on attempting a strategic air campaign in a 1926 wargame, despite lacking the resources to conduct it succesfully.[105] Against these calls for bombing the enemy's strategic rear must be balanced a general opposition to it, mostly based on examination of World War One experience. Svechin noted in *Strategy* that city bombing was 'irritating'.[106] An article by an I. Kovalev on the mission of bomber aviation in 1928 noted that in World War One, London suffered more damage and deaths from crime than from German bombing. Kovalev went on to note that the bombing had stiffened Britain's political will instead of breaking it, asserted that even the combined air forces of Britain

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[103] V. A., 'Tiazhelaia aviatsiia', (*Vestnik vozdushnogo flota*, 3-4, 1920, pp. 12-13); N. Iatsuk, 'Postoiannaia voenno-nauchnaia komissiia Shataba Voenno-vozdushnogo sila RKKA: 6 October', (*Vestnik vozdushnogo flota*, 1, 1923, p. 106-108), M. Stroev, 'Vozdushnii flot, kak element vooruzhennoi sila', (*Voennaia Mysl' i Revolutsiia*, March, 1924, pp. 150-162), pp. 151-156; V. A. Vasiliev, *Long-Ranged, Missile-Equipped*, (USAF Translation; originally *Dal'nii, Raketonosnii*, Moscow: DOSAAF, 1972), pp. 17-18; Boyd, *Soviet Air Force*, p. 26.

[104] S. Mezheninov, 'Voprosi strategii v prilozhenii k vozdushnim silam', (*Voina i revolutsiia*, 1-2, 1926, pp. 108-120), pp. 108-110; S. Mezheninov, *Vozdushnie sili v voine i operatsii*, (Moscow: Gosudarstvennoe izdatelstvo voennoi literaturi, 1927), p. 7-8.

[105] James Corum, *The Luftwaffe: Creating the Operational Air War, 1918-1940*, (Lawrence: University of Kansas Press, 1997), p. 75.

[106] A. Svechin, *Strategy*, p. 160.

and France were insufficient to break a city's morale, and pointed out that even if Soviet bombers were able to reach the projected enemy's factories in the West, the bombs dropped would fall on the Soviet's natural class allies: the workers! Therefore, Kovalev argued that independent bombing operations were 'not in the order of the day' and bombers were to concentrate on closer, more directly military, targets.[107] Interestingly, Kovalev did not consider that bombing railroads would also largely attack railroad workers, possibly due to the militarization of railroads in the Soviet Union.

Thus, even the supporters of independent strategic bombing operations admitted that the Soviets did not possess the force to accomplish such a mission, and most had serious reservations as to the mission's effectiveness or even desirability. Moreover, the mission itself ran against the grain of Soviet thinking, which remained focused on the need for massed, concentrated strikes, preferably on the axis of decision for the ground forces: the air force acting to help ensure the victory on the ground, instead of gaining victory through independent activity. Soviet concepts of air superiority reinforced this bias: if air superiority could only be achieved for a limited time over a defined area, then that time and space ought to coincide with the period in which the ground forces could make the best use of the opportunity of air support and air cover. The development of heavy bombers, however, was neither paradoxical nor purposeless; just because the Soviets did not want to conduct a strategic bombing campaign did not mean that long ranges and heavy bombloads were not desirable features in bombers! Heavy bombloads are useful against any target. Long range was seen to increase flexibility and improve ease of basing, as longer-ranged bombers could be based towards the rear (freeing up space at bases near the front for shorter-ranged aircraft) and could strike at a wider section of the front. Proposed targets for these bombers ranged from railroads to enemy

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[107] I. Kovalev, 'Zadachi bombardirovochnoi aviatsii', (*Voina i Revolutsiia*, May, 1928, pp. 39-47), pp. 39-41 (quote on page 41).

airbases. However, much of the discussion took place in the context of one particular type of operation, itself largely independent, which was foreseen and widely discussed: the operations of an air force in the initial period of a war.

In the 1920s, the Soviets expected the next war to be against some combination of western powers. Poland and Romania were essentially considered givens, albeit as puppets of the western Great Powers at some level, with variants ranging from the lesser powers fighting as proxies, through to those nations providing territory from which the western powers could launch their own armies. The Baltic states and Finland also figured as possibilities. In the 1920s the Soviets seem to have felt no particular threat from the south or east, though as Japan turned militant in the 1930s, its place in their estimations would grow.[108]

The question of the missions of the air force in the initial period of war was first broached in 1921, but lay dormant until 1926, and the discussion only heated up in 1927. There are probably two reasons for the timing of this. The first is that by 1926 and 1927 the notion of operations was beginning to pervade the Soviet military establishment. The second, to be discussed later, was the knowledge of the impending First Five Year Plan's emphasis on military production.

The first mention of the actions of an air force in the initial period of war was quite early, but Iatsuk set the tone for those that followed:

> Without air superiority, even having superiority on land, it is difficult to defeat the enemy, and if the strengths are even, it is impossible.... From this we conclude that no matter how the army and fleet turn to the air force in the beginning of a war for cooperation in their operations, strikes on lines of communications, bases, ships, etc., it is still correct, given the existence of a strong enemy air force, that the war should begin with a decisive strike on it. On

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[108] For a specific discussion of possible war scenarios, see: Tukhachevskii, M. N., editor, *Budushchaia voina*, (RKKA Staff 4th Directorate, 1928), glava I, especially section 4, 'Varianti budushchei voini', pp. 23-29. The variants mentioned in it are much the same as those assumed by the authors of the articles in the Soviet professional journals (*Vestnik vozdushnogo flota*, *Voenaia misl' i revolustiia*, *Voina i revolutsiia*, etc.)

> the outbreak of war, aviation's first step should thus be an operation against enemy aviation. This operation must be well prepared and supported.[109]

Iatsuk's comment, regardless of its theoretical value, was a fantasy for the Red Air force in 1921. Sergeev paid it no particular attention in 1925, probably because of his conviction that the Air Force needed to concentrate on its basic service missions.

In 1926, V. Markevich raised the topic again in an article analyzing the role of aviation during mobilization. Markevich dealt first off with the size of the air force, declaring that even a small air fleet, 'given conditions of manoeuvrability and flexibility', could be a major threat to a capitalist country because of the latter's internal contradictions. Mobilization, by any country, was assumed to proceed in several stages. The first stage, pre-mobilization, would be secret, and hidden under various pretexts, and thus immune to aerial attack. At some point, mobilization would be announced, and since this would in effect be the declaration of war, the Air Force would begin to engage in combat.[110]

During mobilization, the Air Force had a number of roles to play. It had to protect friendly forces from enemy interference, disrupt enemy mobilization, and cooperate in the combat actions of borders units and cavalry reconnaissance forces. Fighters would provide cover. Strikes on the enemy's mobilization, directed especially at railroad stations and yards, were a good idea in principle, but Markevich noted that the Soviets lacked the heavy bomber aviation necessary to conduct such strikes in 1926, and also that World War One experience showed that light bombing raids were of little impact if the troops being bombed were disciplined. While all of this was going on, the Air Force itself would be mobilizing and concentrating its main forces towards the border.[111]

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[109] N. Iatsuk, *O boevom znachenii sovremennoi aviatsii*, (Moscow, 1921), p. 23, quoted in Shishov, 'Sovershenstvovanie', p. 34.
[110] V. Markevich, 'Deistviia aviatsii v period mobilizatsii, sosredotocheniia i razvertivaniia armii'. (*Vestnik vozdushnogo flota*, 7, 1926, pp. 3-6), p. 3.
[111] Markevich, 'Deistviia aviatsii', pp. 3-4.

The Soviets expected mobilization to be followed by a concentration and deployment phase as the armies moved up to the border according to prewar plans. This phase, and the initial period of war, would end when mobilization, concentration, and deployment were complete, and therefore when fully mobilized forces began to enter combat. In the concentration and deployment stage, the Air Force retained the missions from the mobilization phase, though the bombing of rail yards and stations took on added importance, using massed bomber strikes. Reconnaissance was to identify the main enemy groupings, order of battle, and probable direction of the main blow. In addition, the enemy air force would also have completed mobilization, and thus the air war would be in full swing, with fighters and bombers from both sides attempting to destroy the enemy air force. Markevich foresaw this causing considerable losses, and cautioned that it was necessary to retain a reserve to be committed on the main axis of the main blow when the main engagement began. In addition, he felt that the air force, because of the intensity of its work, must not waste effort on patrolling or attempts at continuous bombing or reconnaissance; units should be committed in mass so that they could produce maximum effect for effort expended.[112]

Markevich's conclusions were perhaps not surprising given the rest of his article: the Air Force had to mobilize fast, and its first requirement was covering the mobilization, concentration, and deployment of friendly forces. He noted that a small air force probably could and would avoid air combat, and thus it would be necessary to engage such an air force with escorted bomber strikes on its bases. He doubted that bombing could bring mobilization to a halt though, even so, such attacks had value. He reiterated the requirement that the Army or Front Air Force commander not wear out the Air Force during the mobilization and concentration period, because it would be needed in the main engagement. Markevich did not draw conclusions about the consequent value

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[112] Markevich, 'Deistviia aviatsii', pp. 4-5.

of reducing the length of the mobilization and concentration period, presumably because this was a goal that all branches of the military strove for in any event. However, prior concentration of resources at forward airbases was suggested in order to speed Air Force mobilization and improve their ability to sustain themselves in the initial period of war. Finally, Markevich noted that the aircraft industry, and pilot training, needed to be operating at full speed from the outbreak of war to replace expected losses.[113]

About a year later, S. Mezheninov published *Vozdushnie sili v voine i operatsii* (*The Air Force in War and Operations*), which began with a study of the initial period of war and moved from there to consideration of aerial operations in general. Mezheninov expected mobilization to last about 2 weeks, in which time small forward groups of troops would move forward to seize key pieces of enemy territory and disrupt enemy deployment. While acknowledging the need for the Air Force to cover friendly deployment, Mezheninov felt its primary mission was to strike the enemy, hitting at both close and deep targets to break up enemy mobilization and gain air superiority. If friendly forces planned an immediate offensive, the Air Force should concentrate its efforts on that axis in order to neutralize the enemy and pave the way for the Army's offensive. Mezheninov recommended that the Air Force needed to be maintained at full wartime readiness, with major reserves of kit and extra airfields prepared in peacetime in order to enable it to strike with maximum power as soon as possible. He put forward the British Fleet in 1914 as a model, stating that, being well-prepared for mobilization, it completed its mobilization as the British Army's mobilization began. Likewise, the Air Force had to complete its mobilization and go to war in the shortest time possible, to cover the mobilization of the other services.[114]

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[113] Markevich, 'Deistviia aviatsii', pp. 5-6.
[114] S. Mezheninov, *Vozdushnie sili v voine i operatsii*, (Moscow: Gosudarstvennoe izdatelstvo voennoi literaturi, 1927), pp. 4-7, 20-33.

In connection with the large strikes he foresaw in the initial period of war, Mezheninov argued in favour of producing the heavy industry necessary to provide heavy bombers in large numbers. He believed that their defensive armaments would enable them to fly deep into enemy territory, causing severe morale damage while they bombed cities, factories, concentration sites, and railroads. While these heavy bombers could range deeper, he nonetheless expected the primary zone of air activity to lie within 200 kilometres of the frontier, in which zone both sides could expect to face systematic bombing from the enemy air force. From this, Mezheninov turned to considerations of aerial operations, both in general and in support of ground troops.[115]

In keeping with the growing consensus on air superiority, he wrote that it would need to be regained at the beginning of every operation, although he felt it was best to try to gain air superiority and begin the ground operation simultaneously, which would, naturally, require a large air force such as he repeatedly called for. That large force should still be massed to act on the main axis of the ground offensive – the 'concentration of force on the main region should have an exact relation to the planned ground operation' and support the operation's intent. Just as cavalry served as light reconnaissance when spread across the front, but formed a major strike force when united into a corps, so he felt aviation must concentrate for maximum effect, though he noted that this concentration could be achieved by flying to the target area as much as by basing adjacent to it. Due to inevitable maintenance difficulties and losses, this concentration would occur not only in space but also in time. Commanders would need to plan for minimal use of the Air Force before an operation, to allow the air units to come to maximum readiness. At the outset of the operation, all air units could then begin to operate at maximum intensity, but as losses and mechanical failures mounted, the possible intensity would steadily drop off, a pattern that commanders would have to

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[115] S. Mezheninov, *Vozdushnie sili*, pp. 6-8, 35-39.

accept and work with. A slower, sustainable rate of utilization was not suggested, presumably because it would conflict with the intent to mass for greatest effect at the decisive place and time.[116]

Mezheninov concluded with a look at general command structures. He favoured an independent air force. The general goal of the Air Force in a given operation would align with the intended result of land operations, but the Air Force needed independence because of both its long range bombers and because the immediate goals of its operations would depend on the air situation. Nonetheless, he stated that the ultimate goal of all air activity was to influence the situation on the ground.[117] In a further article that year, Mezheninov considered the problems of concentrating the Air Force, writing that, 'Manoeuvre by air forms the fundamental operational activity of aviation. It constitutes concentration on airbases and the flight from those airbases to the combat zone to be saturated by aircraft.' Much of the article was concerned with techniques for maintaining secrecy while deploying aircraft to forward airbases in order to achieve surprise.[118]

Neither of these works caused comment in the Soviet journals, even the call for heavy bombers and an independent air force. Nonetheless, they mark the first major works to appear in which air force activity was discussed explicitly as an operation, for, while Mezheninov did not define the term 'operation' in either work, the sense of operations was clearly there, with many units cooperating in varied missions orchestrated to achieve an overarching goal. More debated, and more explicitly discussing operational art, was A. S. Algazin's book *Obespechenie vozdushnikh operatsii* (*Securing Aerial Operations*), which appeared in 1928.[119]

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[116] S. Mezheninov, *Vozdushnie sili*, pp. 9-25, 57-75; quote from p. 59.
[117] S. Mezheninov, *Vozdushnie sili*, pp. 7-8, 74-75.
[118] S. Mezheninov, 'Manevr v vozdushnoi srede'. (*Vestnik vozdushnogo flota*, 11, 1927, pp. 4-7). quote from p. 4.
[119] A. S. Algazin, *Obespecheniie vozdushnikh operatsii*, (Moscow: Gosizdat, 1928).

In theory, Algazin wrote about the means of ensuring the security of various types of aerial activity, and a fair proportion of the book is, in fact, dedicated to discussing various tactical expedients. However, the more original sections – and the ones that generated controversy – dealt with the issue of aerial operations, and, flowing from them, issues of goals, air superiority, and command subordination. Algazin began by discussing the definition of an aerial operation, and proposed that it was 'the totality or system of actions of the air force directed to the accomplishment of a single goal'. Some operations might be sub-operations of other, larger operations: for example, the British at the Somme launched a massed fighter operation in order to gain air superiority, which was then used to conduct unopposed reconnaissance, fire correction, and bombing strikes.[120]

Algazin saw 4 basic goals for air operations: reconnaissance, bombing (both close air support and deeper strikes), air to air, and political (leaflet-dropping and similar activity). These goals existed within a framework of three types of air operation. Closely following Lapchinskii's delineations from *Taktika aviatsii*, these were independent, cooperative, and service operations. Independent missions – the Air Force seeking to accomplish the aims of strategy on its own - were possible only in theory, as it was unlikely that nations would face each other only in the air, and not on the land or sea as well. Cooperative operations covered a huge range of possibilities. Examples included Army and Front level reconnaissance, battles for air superiority, and strategic raids such as those the Germans had launched at London in World War One. More simply, cooperative operations were those that assisted the ground forces, but did not fall into the service category. That last category covered the activity of 'everyday' service to the army – close reconnaissance, artillery correction, signals, transport, and the like.[121]

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[120] Algazin, Obespecheniie, pp. 3-25.
[121] Algazin, Obespecheniie, pp. 30-37.

Because of the improbability of an independent air war, and the lack of sufficient aircraft in the near future to conduct one, Algazin concluded that the Air Force was a resource of the army or Front commander. Aircraft would be divided into two types: troop aviation and reserve aviation. Troop aviation would be controlled at the corps and division level as an organic asset and conduct service missions. Reserve aviation, held at the army, Front, and Stavka level, was to conduct cooperative missions: air superiority and bombardment. These reserve air units could be reassigned to mass in a given sector, and in this respect Algazin's proposed system is quite similar to Novikov's successful 1942 reforms. Given the necessity, and the difficulty, of securing their operations, he maintained that the air force must only commit to goals that were both possible and worthwhile, the latter defined as being a goal of real use to the army.[122]

An operation was feasible, in Algazin's eyes, if the Air Force had '*the ability to complete the mission* regardless of the resistance of the aerial enemy'.[123] The main source of opposition would be enemy fighters, and while large aircraft's defences would probably serve to protect them, nonetheless security from enemy fighters would normally come from friendly fighters. Algazin offered a spirited defence of the notion that 'air superiority can only be gained through massive numerical superiority and for a very short time', slamming notions of total air superiority as flawed analogies from naval warfare. Furthermore, Algazin rejected the notion that air superiority was the primary goal of the Air Force: all operations must eventually be connected to the situation on the ground, and air superiority was but a means to an end. As a result, it air superiority was best considered as a subset of any given operation: something that made it possible without losing sight of the actual goal. In addition to a lengthy discussion of the tactics, and sometimes sub-operations, by which various forms of fighter support might ensure the

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[122] Algazin, Obespecheniie, pp. 38-47.
[123] Algazin, Obespecheniie, pp. 47-49; quote from p. 49; italics in original.

security of aerial operations, Algazin concluded by declaring that all the operations of the Soviet Air Force needed to act together in one 'successive-operations system', each operation laying the groundwork for the next.[124]

Algazin's book was clear and generally well-argued, but this did not prevent it from drawing criticism. Lapchinskii, reviewing it for *Vestnik vozdushnogo flota*, praised Algazin for his in-depth examination of an important and hitherto largely unstudied topic, and for the stress Algazin laid on the importance of the unity of air and ground operations. However, Lapchinskii was less happy with Algazin's definition of operations. It covered almost anything done in the air – a single reconnaissance flight might count as an operation. Furthermore, Lapchinskii disliked the looseness of the definition of support operations, feeling that these should be restricted to operations conducted in support of a given ground operation, arguing that without this addition, the bombing of London – not an operation which a ground forces Army commander could order – could be counted as a support operation. Lapchinskii also warned against 'Air Force separatism' arising from an excessively loose definition of support operations - an interesting comment in view of Algazin's repeated declaration of the need for the Air Force to support ground operations. Lapchinskii went on to suggest his own definition of aerial operations:[125]

> Reconnaissance, bombing, and the like are all tactical actions, a number of which, in connection with the tactical actions of ground troops, form an operation. [....] An aerial operation occurs when, in addition to the actions of aircraft in relation to the ground, there is a purely aerial axis to the work of aviation. All the originality of the question lies in the fact that aviation always has two directions of view: on the ground and in the air. [....] That a pilot is doing operational reconnaissance does not make his flight an operation.[126]

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[124] Algazin, Obespecheniie, pp. 49-62, 132-134. Quotes from pages 62 and 134.
[125] A. N. Lapchinskii, 'Review: A. Algazin, *Obespecheniie vozdushnikh operatsii*, Moscow, Gosizdat, 1928', (*Vestnik vozdushnogo flota*, 3, 1928, pp. 45-46); pp. 45-46, quote from p. 46.
[126] Lapchinskii, 'Review: *Obespecheniie vozdushnikh operatsii*', p. 46.

Nonetheless, Lapchinskii recommended the book, declaring it 'required reading for every member of the Air Force, because it forms a new stage in the development of our aerial thought.'[127]

Whatever complaints may be laid against Algazin's or Lapchinskii's definitions of aerial operations, they did represent a new stage in Soviet theory, alongside the other articles from 1928 dealing with operations in connection with the missions of heavy bombers. One further article deserves mention. *Vestnik vozdushnogo flota* tended to have a number of articles every autumn analyzing the results of the summer manoeuvres. In 1928, in addition to the usual complaints about the difficulties of air-ground cooperation and poor tactics, along with corresponding notes on new methods attempted to cure these problems, V. Khripin noted in respect to the year's manoeuvres:

> Freedom of manoeuvre not only for aerial, but also for ground echelons, is attained through superiority over the enemy…. This manoeuvrability and all that flows from it in terms of missions, control, and material supply, was the first and fundamental operational theme.
>
> The actions of units and combined units of aircraft over a large radius in an organized air defence system on a dispersed base was the second fundamental theme.[128]

This was the first reference to operational art in the reports on manoeuvres, if a somewhat veiled one. While providing little detail beyond this note on themes, Khripin's article indicates that the wider problems of air force organization and orchestration were working into a new, operational, context in the minds of the Air Force's officers. Ten years before, problems of wider organization had been largely pipe dreams next to the immediate problems of the Civil War. Five years before, they had been largely subsumed under desperate attempts to maintain a stock of flyable aircraft – the easing of which problem appears to have been the main impact of the German-Soviet exchanges on the Air Force, there being no other trace of them in the public debate.

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[127] Lapchinskii, 'Review: *Obespecheniie vozdushnikh operatsii*', p. 46.
[128] V. Khripin, 'Itogi manevrov i nashi zadachi', (*Vestnik vozdushnogo flota*, 11. 1928, pp. 11-14), p. 11.

The Soviets put their emerging thinking on the nature of warfare into doctrine with the *Polevoi ustav RKKA 1929* (*PU-29, 1929 RKKA Field Regulations)*, outlining the concepts of deep battle upon which they would build deep operations concept during the next decade. On the role of aviation, *PU-29* says:

> Aviation - cooperates with ground troops in the accomplishment of combat tasks, attacking enemy troops from the air and protecting them [friendly troops] from enemy air attacks through battle with the aerial enemy; it paralyzes the enemy rear; conducts aerial reconnaissance of the enemy; serves the command and troops with reconnaissance, observation of artillery fire, and communications; and fulfills separate [samostoiatel'nii] operational missions.[129]

In battle, aviation's directed missions were:

> a) aerial reconnaissance, observation, communications, and service to the commander;
> b) combat actions against ground targets (immobile and mobile);
> c) combat actions against the enemy in the air.[130]

PU-29 divided aircraft into troop and army aviation. Troop aviation remains undefined and little discussed in *PU-29*, beyond a note that it should discern the enemy's operational groupings "to a depth of four marches", while its battlefield reconnaissance efforts discovered the enemy's forces and movements. Army aviation constituted those "bombers, close support, and fighter" aircraft formed into an Air Group and subordinated to an army for combat against the enemy in the air and for support of ground forces. In providing this support, "Cooperation between aviation and ground forces is to be achieved through close agreement and subordination of aviation's actions to the overall operational concept" and reinforced through excellent communications between the air and ground command staffs.[131]

While PU-29 did not directly specify who would control air units, it did direct the specialized arms (such as artillery) and supporting services (such as signals) assigned to formations of division or larger size should be commanded by an officer from the

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[129] *Polevoi ustav RKKA 1929*, (Moscow: NKO SSSR, 1929), p. 14.
[130] *PU-29*, p. 84.
[131] *PU-29*, p. 41, 84, quotes on p. 41, 84, and 84, respectively.

appropriate branch and attached to the formation as a member of its command staff. Thus, specialists commanded their own units, but were themselves subordinate to the needs to the combined-arms formation. In theory, this ensured both coordination between different branches and the presence of knowledgeable staff to advise on vtheir capabilities and limitations. Reading between the lines, the Air Group, while not required to place its commander at the main headquarters of its assigned army, would be wise send a senior representative as a liaison officer.[132]

PU-29 directed combat aviation of all types to act in mass, both for self-defence and for offensive power. Close support aircraft were directed to utilize low altitude flight ("shaving flight") to close on targets, in order to ensure surprise, while fighters were directed to use formations permitting the commander's will to be exercised, while permitting maneuver for simultaneous attack on enemy air units. Interestingly, PU-29 also laid out "characteristic" altitudes for reconnaissance, fighters, combers, and close support aircraft.[133]

In meeting engagements, *PU-29* specified the use of fighters to cover the deployment of the main force and the work of other types of aviation – the latter being tasked with pinning the enemy, ensuring their inability to deploy in useful terrain. On the offensive, bomber aviation tasked with supporting ground units was expected to attack enemy artillery, headquarters, supply dumps, and airbases, wile attriting enemy strength. Close support aircraft received the same mission list, minus the airbases, while fighters were directed against enemy reconnaissance and combat aviation operating over the battlefield. On the defensive, reconnaissance was to provide ample warning of enemy movements through reconnaissance, again 4 marches deep, while other aircraft were reserved for attacks against the attacking enemy, with bombers attacking tanks and all air

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[132] *PU-29*, p. 22-23.
[133] *PU-29*, p. 84-85, quote p. 85.

support preferably coming simultaneously with attacks by other arms in order to break the attack.[134]

In the words of the review of *PU-29* in *Vestnik vozdushnogo flota*, it 'solidified the place of aviation in general tactics, in close connection with actions on the ground.' The consensus in the Air Force on the principle of mass, and the need to support the land forces, shows clearly in *PU-29*. However, *PU-29* contains few specifics on how the Air Force should conduct its actions. While fighter aviation is directed to secure the battlefield from enemy air activity (defensive counter-air), offensive counter-air missions receive little mention. The general mission of aviation mention paralyzing the enemy's rear, but the specific tasks outlined rarely run deeper than the enemy's tactical formations. Interdiction of railroads, let alone attacks on deeper targets, gain no mention at all in this manual devoted to the Army's activity, unless it is the note that aviation conducts separate missions in addition to the other listed. [135]

Few Soviet Air Force officers would have contested the need to mass airpower for maximum effect, whether the air force were small or large. Equally, few would have contested the need to coordinate the Air Force's actions with the needs of the land forces; even the actions in the 'separate' category amount to air interdiction in support of the land forces. The division of aviation into troop and army aviation, and their intended roles, corresponds fairly closely to Algazin's division of aviation into troop and reserve, though the *PU-29* variant lack the inherent flexibility of Algazin's proposal. Consensus was building around the notion that air superiority was a temporary thing in time and space, to be seized by the application of massed airpower. Support of the army, the temporary nature of air superiority, and massed employment would remain cornerstones of Soviet thinking.

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[134] *PU-29*, p. 102, 131-132. 164, 168-169, 174.
[135] A. Lapchinskii, 'Review: *P. U. 29*, Gosizdat, Moscow, 1929', (*Vestnik vozdushnogo flota*, 10-11, 1929, pp. 103-105), p. 105.

However, the Air Force was beginning to move beyond *PU-29* in its thinking about command relationships, as shown in Algazin's proposal to use reserve aviation to mass air units at critical sectors, and *PU-29* left the issue of priorities of aviation's work unclear: should gaining air superiority take precedence over providing ground support? Was air interdiction more important than close air support? While bombers, close support aircraft, fighters, and reconnaissance each had its own 1929 field regulations, these were criticized by Lapchinskii as incompletely worked through, and for being separate instead of a combined manual because it complicated the problem of figuring out how they were to work together. The fighter manual specified that the battle for air superiority coincided with the ground battle, but defined air superiority as "the condition in which relative freedom of action has been secured for our air force, and the activity of the enemy air force is limited", focusing on the use of fighters for defensive counter-air by using them to deny airspace to the enemy. The Soviets were coming to grips with the issues they needed to tackle, but had not come to consensus on the methods for doing so.[136]

During the interwar years, the Soviets were kept informed of developments in foreign thinking about the use of air power. *Vestnik vozdushnogo flota* periodically printed translations of foreign articles on airpower, though this practice became less and less common as the 1920s continued, with only an article or two per year during the 1930s. In addition, various major foreign works were translated and published, including Douhet, Liddel-Hart, and Fuller. The Rapallo exchanges with Germany placed German instructors in the Soviet Air Force Academy from 1924 until 1933 in addition to the training and experimentation airfield at Lipetsk.

Elsewhere in Europe, two essential responses to airpower emerged. On the one hand, charismatic or outspoken advocates of airpower's potential such as Giulio Douhet

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[136] A. Lapchinskii, *Review: B. U. I. Av – 29, Gosizdat, Moscow, 1929*, (*Vestnik vozdushnogo flota*, 10-11, 1929, pp. 105-106.), quote p. 106. Unfortunately, these four manuals could not be obtained for direct examination.

in Italy, Hugh Trenchard in Great Britain, Pierre Cot in France, and William Mitchell in the United States, advocated independent actions by heavy bombers against the enemy's forces, cities, industry, and morale. The second, less provocative, response advocated an air force operating in close connection with ground and naval forces, with the capability of providing both close air support, air interdiction, and counter air operations. The precise mechanism by which these ideas played out in each country depended in part on contingency. In Italy, Douhet lost the debate to Amadeo Mecozzi, who advocated a support role, while in France, air force advocates of strategic bombing could not overcome the Army's grip on doctrine. Germany seemed poised to pursue strategic bombing as well as supporting the ground forces, but failed to develop a viable heavy bomber during the earlier 1930s, then lost political support in the face of Ernst Udet's interest in dive bombing. The Royal Air Force achieved its independence and pursued strategic air warfare in part to justify that status, while in the US aviation remained part of the US Army, but its officers used arguments similar to the RAF's in its pursuit of organizational independence and a strategic air war. Yet, for all the contingency involved in the results, a striking pattern emerges. Those western powers with a peer competitor on a land frontier, Germany, France, Italy, and the Soviet Union, for all the differing paths of their internal debates, consistently placed support for the ground forces as the central role of airpower. The United States and Great Britain, western powers without a peer competitor on a land frontier, also engaged in extensive internal debate on the role of airpower, but overall leaned towards strategic airpower. This pattern strongly suggests that geographic reality provided a strong driver in these debates. In those nations where losing the ground war would lead to national defeat, supporting the ground forces remained a priority. Those nations not facing a mortal ground threat did not prioritize ground support.[137]

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[137] Philip S. Meilinger, 'Trenchard, Slessor, and Royal Air Force Doctrine before World War II',

As the Soviet Air Force emerged from the Civil War, and the Soviet economy slowly revitalized, wider and wider issues of organization came to the fore. It seems likely that the Army theorists led the way on operational art, but the Air Force was not long behind them. Earlier it was noted that one reason for the appearance of debate on operational topics, and independent operations in the initial period of war, was the rise of operational theory in the Army. The second probable reason was economics, for by 1927 it became increasingly clear that one of the most basic ground rules of the debate was about to change.

The Soviet's national economic planning agency, Gosplan, began working on long-range planning in 1925-1926. In December 1927, the 15th Party Congress approved their draft concept, and the resultant first Five Year Plan was officially approved by the 16th Party Congress in April 1929.[138] The First Five Year Plan capitalized on an industrialization drive already underway by 1927 by adding in a major military rearmament whose outlines were finalized in July 1928 and then increased at the 16th Party Congress a year later. Given Tukhachevskii's advocacy of an increase in military production while Chief of the General Staff (1925-1928) and in the secret 1928 threat study he edited, *Budushchaia voina* (*Future War*), it is extremely unlikely that any of the senior military staff were unaware, first, of the possibility of a major plan to increase industrial capacity, and second of the probability that this would include an increase in military production.[139] Until this time, one of the givens in the debate was that in reality,

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(Meilinger, ed., *The Paths of Heaven*, pp. 41-78); Mark A. Clodfelter, 'Molding Airpower convictions: Development and Legacy of William Mitchell's Strategic Thought', (Meilinger, ed., *The Paths of Heaven*, pp. 79-114); James Corum, 'Airpower Thought in Continental Europe between the Wars', (Meilinger, ed., *The Paths of Heaven*, pp. 151-181); James Corum, *The Luftwaffe: Creating the Operational Air War*, (Lawrence: University of Kansas Press, 1997); Tami Davis Biddle, *Rhetoric and Reality in Air Warfare*, (Princeton: Princeton University Press, 2002). Japan, where aviation remained strictly subordinate to the Army and Navy, appears to be the exception to the rule.

[138] Robert McNeal, *Stalin: Man & Ruler*, (New York: New York University Press, 1988), pp. 114-115; Chris Ward, *Stalin's Russia*, (London: Arnold, 1993), pp. 76-77.

[139] James Schneider, *The Structure of Strategic Revolution: Total War and the Rise of the Soviet Warfare State*, (Novato: Presidio, 1994), pp. 262-265; Tukhachevskii, ed., *Budushchaia voina*, Chapter VII

the Soviets would have a small air force backed by a weak industrial sector, quite possibly facing the combined might of the nations of the industrialized West. With the advent of the first Five Year Plan, the prospect of a fully industrialized Soviet economy pouring out thousands of aircraft could no longer be dismissed as a fantasy of the far future. Between this and the flowering of debate about operational art, the time of assuming that a realistic scenario required a small Soviet Air Force with limited means was over. The mass of aircraft to provide the material for aerial operations was on the horizon, and within the next ten years it would arrive.

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demonstrates the problems and directly calls for more and newer aircraft p. 732; David Glantz, *The Motor-Mechanization Program of the Red Army During the Inter-War Years*, (Fort Leavenworth: SASO, 1990), pp. 9-10; Jacob Kipp, *Mass, Mobility, and the Red Army's Road to Operational Art, 1918-1936*, (Fort Leavenworth: SASO, year unknown), pp. 21-22; Ward, *Stalin's Russia*, pp. 77-81; Lennart Samuelson, *Plans for Stain's War Machine: Tukhachevskii and Military-Economic Planning, 1925-1941*, (Basingstoke: Plagrave, 2000), chapters 2-5.

Chapter 2
Expansion: 1928-1937

In the 1920s, Soviet Air Force theorists were approaching consensus around several basic issues. Key amongst these were that the air force existed to support the ground war, and it would be small: both in absolute terms, and smaller than its likely enemies. With the advent of the Five Year Plan one of these key assumptions became void. The Soviet Air Force underwent massive expansion in numbers in the early 1930s. Unsurprisingly, the debate over large or small air forces suddenly came to a close, and a large air force well supported by heavy industry was soon a fundamental assumption.

At the same time, the early 1930s saw a steady change in the capabilities of the aircraft. New designs coupled with new engines drove aircraft faster, higher, and with larger payloads than previously possible. This helped to reopen debates on the role of the air force and the missions it ought to perform, especially in the middle 1930s when it appeared the heavy bomber might be taking the lead as the pre-eminent form of aircraft in the sky.

However, the debates were cramped by politics. On several occasions, debate came to a near-standstill. Stalin's 1928 denunciation of wreckers, including non-Communist specialists, brought officers without strong ideological credentials under increasing pressure. The Communist Academy's Section for the Study of Problems of War, formed in 1929, led this process, trying to rival the Frunze Academy as a source of military knowledge due to their use of Marxism-Leninism. To his discredit, Tukhachevskii used this as a platform for his disagreements with Svechin, taking part in a blistering attack on Svechin in April 1931.[140] In doing so, Tukhachevskii assisted in the

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[140] *Protiv reaktsionnikh teorii na voenno-nauchnom fronte: kritika strategicheskikh I voenno-istoricheskikh vzgliadov prosveshcheniia* (Moscow: Gosvoenizdat, 1931) provides the published version of the public session. See also Jacob Kipp, 'General-Major A. A. Svechin and Modern Warfare: Military History and Military Theory', (in Svechin, *Strategy*, pp. 23-56), pp. 48-50.

politicization of debate inside the Soviet military, playing an active role in the process that led to both his own and Svechin's death during the purge that began 1937. Combined with the Party's internal cleansing of its ranks, known as the *chistka* (cleansing) because it claimed to be the recall of all Party identification cards into order to verify them, produced a dampening of debate in military affairs in 1932. The chill manifested itself in Soviet military theory journals through a spate of thoroughly anodyne articles. For instance, *Vestnik vozdushnogo flota*, previously a source of intense debate, shifted its focus to stunningly innocuous topics, such as a series of articles on basic flight proficiency, and for much of 1932 it largely ignored all questions above the smallest and most technical tactical scale, apparently printing nothing that could possibly get the editors into trouble.

Nonetheless, debate in print eventually resumed. Points of consensus were not many in the debates of the time. While a consensus appeared to be evolving in the early 1930s around the primacy of close air support and air interdiction in support of ground operations, changes in the perception of the abilities of heavy bombers initiated a debate over the possibility and desirability of heavy bomber strikes on the enemy's deep rear. The degree to which Soviet officers were convinced of the deep strike case can be overstated, because while the supporters of deep strikes were vocal, a strong and steady undercurrent for operational ground support ran through the works of even the deep strike advocates. Ultimately, the heavy bomber debate was overtaken by events, not only the purges in the Soviet Union, but also the civil war in Spain, where the Soviets began to get hard data on the combat effectiveness of aviation.

Spurred by increasing failures of the NEP economy, the Soviet government diverted resources into industrial production on a grand scale and, in doing so, created a sea change for Soviet aviation theory. The first Five Year Plan, which officially ran from

1929 to 1932, involved a high degree of chaos with constant bottlenecks and ever-increasing production targets. Nonetheless, it did produce a great deal of industrial expansion, and a concurrent growth in the Air Force. In 1928, the Soviet Air Force had 914 aircraft. By 1932, this had more than doubled to 2,097, and totalled 8,043 in 1936, by which time the Soviets were producing over 4,000 aircraft a year.[141] A small Soviet Air Force was no longer a valid assumption, and, unsurprisingly, the 1920s debate about the validity of assuming large-scale production of aircraft 'sometime in the future' disappeared as the Five-Year Plan got underway.

Alongside the growth in numbers, two types of qualitative changes occurred. The first, into which we will not go in detail, was in the capabilities of the aircraft, which were able to fly significantly higher, faster, and with larger payloads than before. Heavy bombers' payloads began to be measured in the thousands of kilograms, and in the mid-1930s exploration of the stratosphere began as well. Equally, however, the balance of types of aircraft in the air force began to change.

In 1928, the Soviets had 914 aircraft. Of these, 532 (58%) were reconnaissance and communications aircraft, 176 (19%) were fighters, 26 were trainers, and 168 (18%) were bombers of some variety, including 16 TB-1 heavy bombers.[142] This force, oriented towards reconnaissance, communications, and artillery spotting, was not particularly capable of significant close air support, let alone the longer-range air interdiction support ('separate') or independent operations of which some theorists had written. The intent to accomplish larger tasks than reconnaissance, communication, and artillery spotting was there, however, and in the next few years the intent was translated into aircraft.

By 1932, the Soviets had 2,097 aircraft, of which 330 were heavy bombers, 487 were fighters, and 1,135 were 'light bombers, close attack aircraft, and reconnaissance'.

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[141] Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 86, 157, 180, 183.
[142] Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 90.

On 23 February 1933, Voroshilov stated that the ratios of aircraft types – roughly equal between heavy bombers, light bombers, fighters, and reconnaissance – were those that should be maintained. By January 1, 1937, the Soviet aircraft park had grown (and the ratios had changed), to number 2,443 heavy and fast bombers, 1,779 light, close attack, and torpedo bombers, 2,255 fighters, and 1,662 reconnaissance aircraft, for a total of 8,139 aircraft. The ratios had changed from roughly equal to about 30% each for heavier bombers and fighters, and about 20% each for lighter bombers and reconnaissance. Production was even more weighted towards the heavier aircraft and fighters, as reconnaissance aircraft and close air support aircraft (shturmoviki) tended to be outdated fighter aircraft at that time.[143]

To support this growing force, not only was direct pilot education expanded, but civil training was enlarged as well. The OSOAVIAKHIM (Society for Chemical and Aviation Defence), begun in the late 1920s, was well funded throughout the 1930s. Over the course of that decade, it claimed to have trained hundreds of thousands of parachutists and tens of thousands of aircraft mechanics and pilots, including two of the top Soviet World War Two aces, I. Kozhedub and A. Perishing. The critical importance of this reserve, however, was not seen until the Second World War, when it provided the Soviets with a large base of manpower with at least some basic training already in hand from which to rebuild their shattered forces.[144]

The intended employment of this rapidly expanding and increasingly well-funded force was the subject of much debate, however. While there had been some debate in the 1920s on the role of the Air Force, arguments in favour of a wider role had been tangled in doubts about the ability of the Air Force to possess enough aircraft to accomplish missions wider than tactical air support and reconnaissance. The dramatic expansion in

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[143] Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 180-183.
[144] L. Borisov, 'Oborono-massovaia rabota OSOAVIAKHIMA (1927-1941 gg.)', (*Voenno-Istoricheskii Zhurnal*, 8, 1967, pp. 40-51).

aircraft numbers left the field open for a complex debate combining attitudes about air to air armament and air superiority, which in turn informed debate on the proper role of the air force. All were characterized by a lack of hard data from experience – experience the Soviets would eventually begin to gain by flying over Spain. (While 66 aircraft were used in combat against the Chinese during the Chinese Eastern Railway conflict in 1929, the Chinese did not put up any aerial resistance, and virtually all of the air activity was reconnaissance and tactical bombing.[145]) In general, however, the debate can be seen as a series of questions nested like a matrioshka doll. Concepts of the nature and effectiveness of aerial combat and bombardment necessarily inform debates over how and if an air force can gain air superiority, and what the latter means. In turn, concepts regarding the means of gaining air superiority inform the ability of the air force to perform any other mission.

Thus, underlying much of the debate was a fundamental disagreement on the nature of aerial combat, which itself mirrored debates elsewhere in the world. Would the single-seat fighter continue, as in World War I, to hold tactical superiority over other aircraft, and thus be the primary aircraft killer in aerial combat? Had improvements in the speed and payload of multi-crew aircraft made possible heavier, faster-firing defensive heavy machine guns and light automatic cannons whose accuracy, range, and wide arcs of fire would render the single-seat fighter obsolete? Was it time to develop heavy 'cruiser' aircraft, similar in design to heavy bombers, but carrying heavy antiaircraft weapons? Or would the ability of the fighter to carry some of the same weapons, and to manoeuvre to choose its time and method of attack, leave larger aircraft still vulnerable?[146]

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[145] V. M. Zaretskii, A. G. Pervov, *Boevie deistviia Sovetskoi aviatsii v lokalnikh konfliktakh i voinakh 1921-1941 gg.: Lektsiia*, (Monino, Voenno-vozdushnaia akademiia, 1991), pp. 6-7.

[146] See, for example, F. Arzhenukhin, 'Vozdushnii boi tiazhelikh bombardirovshchikov', (*Vestnik vozdushnogo flota*, 8-9, 1932, pp. 8-11).

Sharp arguments arose over the nature of aerial combat, notably in a 1935 review[147] of Lapchinskii's *Vozdushnii boi* (*Air Combat*)[148] by Ionov, Shcherbakov, and Chaikin.[149] Lapchinskii had the temerity to write that single seat fighters could defeat even turret-armed multi-seat fighters and to suggest that heavy bombers would need extensive armouring to survive the attacks of single-seat fighters. The review – polemic would be a better term – took Lapchinskii sternly to task for this point of view, attacking everything from his conservative calculations of probable bullet impacts, to his assertion that pilots could fly aircraft in part by feel. Indeed, in 1935-1936, the tide of opinion seemed to be running strongly in favour of multi-seat fighters; but experience in Spain soon brought the single-seat fighter back into favour, so only limited design work was ever attempted on multi-seat fighters.[150] The scale of the debate can be overstated; except when debating the specific issue of fighter design and tactics, most authors tended to assume that fighters would act as interceptors, and be capable of downing, with some degree of loss, the targets they were sent after. Equally, however, while we cannot know where the debate might have ended without experience in Spain, opinion appeared to be moving steadily against the single-seat fighter until the Battle of Madrid.

Alongside this debate on air to air combat was a growing notion that the greater bombloads of newer aircraft, particularly heavy bombers, had made aircraft a much more potent threat to ground targets of all types. Much of this conviction rested on simplistic assumptions about bomber's accuracy, bomb effectiveness, and the ability of aircrew to find targets. As in the debate on fighters, the dissenting voice was Lapchinskii. His *Bombardirovochnie rascheti* (*Bombardment Calculations*), published in 1935, began his

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[147] Ionov, Shcherbakov, Chaikin, 'Review: A. N. Lapchinskii, *Vozdushnii boi*, Gos. Voen. Izdat, 1934.', (*Vestnik vozdushnogo flota*, 7, 1935, pp. 46-53).
[148] A. Lapchinskii, *Vozdushnii boi*, (Moscow: Voenizdat, 1934).
[149] This may be the same Colonel Shcherbakov who commanded 50th Army's air group during the Battle of Moscow. Chaikin is not identified. (Fetzer, *Soviet air Force in World War 2*, p. 77.)
[150] The change of opinion appears in: I. Kovalev, 'Rol' i zadachi sovremennoi istrebitel'noi aviatsii', (*Vestnik vozdushnogo flota*, 5-6, 1937, pp. 100-135), who considered 1935 the low point in the single-seat fighter's fortunes. Regarding abortive development of heavy fighters, see Boyd, *Soviet Air Force*, p. 62.

critique of the accuracy of high-altitude bombing, and it was carried forward in his subsequent books and articles.[151] These works met with surprisingly little direct resistance, despite such pointed commentary on high-altitude bombing as, 'saving itself in the skies from enemy fighters and anti-aircraft artillery [through staying at high altitude], an airplane at the same time "saves" its target from its bombs'.[152] Other authors were apparently content to assume accurate bombing without challenging Lapchinskii's analysis, and A. Algazin, a staunch advocate of strategic bombing by the mid-1930s, went so far as to assert in a 1936 primer on aviation that new sighting devices made heavy bombers very accurate from high altitudes – while, in the acknowledgements, thanking Lapchinskii for technical advice![153]

Just as the majority of writers seem to have assumed, as part of their 'mental furniture', that fighters could take on bombers, so they also tended to assume that bombers were fairly accurate regardless of altitude, target, and attack profile. These two assumptions and debates, paired with the increase in the size of the Soviet Air Force and the technical capabilities of its aircraft, formed the underlying material for interconnected discussions on four topics centred on the role of the air force in a future war: 'separate' and 'independent' operations by the air force, air superiority, the role of aviation in the initial period of war, and strategic bombing. Since the issue of 'separate' and 'independent' missions underlies the others, it forms a logical starting point.

As seen in the previous chapter, in 1926 Lapchinskii introduced terminology for a three-way split that had become standard for typifying the general nature of missions: independent (nezavisimii), separate (samostoiatel'nii), and service (sluzhatelnii). Service

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[151] A. N. Lapchinskii, *Bombardirovochnie rascheti*, (Moscow: Voenizdat, 1935); A. N. Lapchinskii, *Bombardirovochnaia aviatsiia*, (Moscow: Voenizdat, 1937); A. Lapchinskii, 'Osnovnie voprosi sovremennoi aviatsii', (*Voina i revoliutsiia*, No. 3-4, 1937, pp. 85-95).

[152] A. Lapchinskii, 'Osnovnie voprosi sovremennoi aviatsii', (Voina i revoliutsiia, No. 3-4, 1937, pp. 85-95), p. 90.

[153] A. Algazin, *Aviatsiia v sovremennoi voine*, (Moscow: Voenizdat, 1936), p. 3 (acknowedgements), 112 (accuracy of heavy bombers).

missions included reconnaissance, artillery spotting, and signals missions – activity in direct service of the Army. Separate missions were those that had a direct impact on the ground battle, but were conducted by air units not organic to frontline divisions or corps; this category that included everything from operational interdiction of rail lines and air superiority to close air support. Independent missions were conducted against the enemy's deep rear, bombing factories or cities.[154]

While this terminology gained wide currency, and the book in which it was promulgated, *Taktika aviatsii*, went through three editions, use of the terminology was not always quite along the lines of Lapchinskii's definitions. 'Service' missions underwent no changes in terminology. However, the term 'separate' (samostoiatel'nii) was sometimes used to refer to bombing the enemy deep rear, as we will see below, and thus was often a blanket term for any large-scale aerial activity not engaged in direct support of ground operations. This probably occurred because the term 'samostoiatel'nii' means 'independent' as much or more than 'separate' ('separate' has been used in this work in order to distinguish 'samostoiatel'nii' from 'nezavisimii', which also translates to 'independent', but was used in reference to missions undertaken with no reference at all to the ground forces' situation.) All agreed with Lapchinskii's original caveat that missions beyond 'service' ones required a large air force, but given the industrial expansion of the Five Year Plans, this no longer applied a brake to the possibilities of the Soviet Air Force.

Nonetheless, while debate on the term was not sharp, some evolution of view did occur. The simpler half of this evolution was structural and can be traced through official changes to doctrine and organization. *PU 1929* (*1929 Field Regulations*) divided aviation into 'Troop' and 'Army' aviation; the former mostly subordinate to Corps HQs and consisting of service aircraft, while the latter was subordinate to Army HQs and had

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[154] Lapchinskii, *Taktika aviatsii*, p. 13-21.

combat aircraft.[155] Four years later, on 23 March 1932, the Revolutionary Military Council declared that aviation had moved from a support arm to a separate branch of the military, with divisions between service, Army, and Front aviation. In 1933, the VVS formed a special corps, intending to unite all heavy bombers and cruisers (large aircraft armed for air to air combat as long-range bomber escorts), and make them directly subordinate to the Chief of the Air Force, Iakov Alksnis. In 1936, they formed the first of the Special Purpose Air Armies (AON [sic], Aviatsionnie Armii Osobogo Naznacheniia), directly subordinate to the High Command, commanded by Khripin, and containing two heavy bomber brigades, a light bomber brigade, and a fighter brigade. *Vremennoi polevoi ustav RKKA 1936 (PU-36, 1936 RKKA Temporary Field Regulations)* defined aviation as engaging in both separate [samostoiatel'nii] actions and ground support.[156] Thus, structurally, by the time of the Spanish Civil War the Soviet Air Force had formations capable, in theory, of conducting deep independent missions, along with an official doctrinal license to do so and strong support from Khripin. He, as Chief of Staff of the Air Force (second only to Iakov Alksnis in the chain of command), could and did influence Soviet construction priorities in favor of bombers until his arrest in 1937. The debate behind this doctrine, however, forms a more complex stew.

The most basic of the separate missions, and one on which there was broad agreement regarding necessity if not methodology, was the need to gain air superiority. Before the Five Year Plan, the reality of a small air force meant that most Soviet theorists thought air superiority was a temporary, tactical phenomenon, gained by fighters massed to control a limited airspace for a limited time, possibly with the support of bombers striking enemy airbases. This was also the official point of view, reflected in both the *Boevoi Ustav Istrebitel'noi Aviatsii 1929 (1929 Fighter Aviation Combat Regulations)*

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[155] *Polevoi ustav RKKA 1929*, pp. 84, 131-132.
[156] Shumikin, *Sovetskaia voennaia aviatsiia*, pp. 180-182; Migulin, *Teoriia i praktika*, pp. 25-28, 38.

and in the *PU-29*, both of which emphasized that the battle for air superiority took place at the times and areas designated by the Army.[157]

However, because of the increasing abilities of bombers, both real and perceived, theorists paid increasing attention to the role of bombers in gaining air superiority by striking enemy airbases, as opposed to the use of fighter patrols to destroy enemy aircraft. The concept of gaining air superiority through strikes on airbases is essentially the same as the modern concept of offensive counter-air (OCA), though the Soviets did not use the term. The use of fighter patrols bears some similarity to the modern concept of defensive counter-air (DCA), though the Soviets typically saw the air combat route to air superiority as involving aggressive patrolling, not the defence of friendly forces and sites.

Khripin, for example, a supporter of heavy aviation, noted that in the 1929 manoeuvres at Bobruisk, air superiority was hotly contested by both sides, and that, 'The experience of this work showed yet again the absolute superiority of active measures on enemy aerodromes over all other methods of aerial combat.'[158] This came about because defensive patrols reduced fighter strength to one third of its potential at any one time, while an attacker could bring all of his fighters to bear at the moment of battle and could guarantee a fight by attacking the airbases, forcing the other side to defend them. Khripin went on to emphasize the importance of reconnaissance of enemy airbases, and the need to act quickly on the data gained; details which, as the Soviets would discover in Spain, made the airbase attack concept more difficult than they supposed.[159]

The topic lay dormant for the next few years. As the numbers of heavy bombers in the Air Force rose, the issue began to crop up again. In 1931, Khripin criticized the third edition of Lapchinskii's *Taktika aviatsii* for claiming that 'only fighters can provide

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[157] A. Lapchinskii, 'Review: *Boevoi Ustav Istrebitel'noi Aviatsii – 1929*, Gosizdat, Moscow, 1929', (*Vestnik vozdushnogo flota*, No. 10-11, 1929, pp. 105-106), p. 106; *Polevoi ustav RKKA 1929*, pp. 84, 132.
[158] V. Khripin, 'Iz opita Bobruiskikh manevrov', (*Vestnik vozdushnogo flota*, 10-11, 1929, pp. 4-8), p. 4.
[159] Khripin, 'Iz opita Bobruiskikh manevrov', p. 4-5.

air superiority.'[160] In his own primer on the Air Force, written in the same year for a very general audience, Khripin assigned heavy bombers the pride of place in gaining air superiority because of their ability to bomb airbases. However, he cautioned that the need for repeated strikes on enemy airbases, and the large number of enemy airbases, meant that the struggle for air superiority would be lengthy, and absolute superiority probably impossible.[161]

In his 1932 book *Vozdushnie sili v boiu i operatsii* (*Air Forces in Battles and the Operations*), Lapchinskii defined air superiority as a spectrum of the ability of one side or the other to interfere with enemy ground operations. Lapchinskii presumed that air forces would be able to reconstitute their front-line strength relatively rapidly from rear areas. Therefore, to gain complete air superiority, as opposed to temporary air superiority, it would be necessary not only to shoot down enemy aircraft and destroy their bases, but also to destroy the factories at which they were made. Complete air superiority, he said, was gained 'not through a *blow* or *battle*, but through a *system*, which is complex and lengthy.' In this attritional framework, camouflage of friendly airbases and the detection of enemy airbases would play a significant role, since bombing airbases was the most efficient means of destroying active enemy aircraft. Lapchinskii assigned bombers primarily to these airbase strikes. His scepticism regarding the ability of bombers to hit factories and their ability to survive deep raids without escort probably precluded suggesting factory bombing as the bomber's primary mission.[162]

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[160] V. Khripin, 'Review: A. Lapchinskii, *Taktika aviatsii i voprosi protivovozdushnoi oboroni*, (*Vestnik vozdushnogo flota*, No. 5-6, 1931, pp. 87-89), p. 87-88 (quote on page 88). The title of Lapchinskii's book was apparently expanded for this edition (see p. 87 for assertion it is the third edition.)

[161] V. Khripin, *Vozdushnii flot: voenno-politicheskii obzor organizatsii, vooruzheniia i primeneniia*, (Moscow: Molodaia gvardiia, 1931), pp. 62-65.

[162] A. Lapchinskii, *Vozdushynie sili v boiu i operatsii*, (Moscow, Gosizdat, 1932), pp. 68-69, 90-97, quote on p. 97. His scepticism of bombers' high altitude accuracy was thoroughly explored in *Bombardirovochnie rascheti*, (Moscow: Voennaia akademiia im. Frunze, 1935) and it is not unreasonable to suppose he already had the notion.

P. Ionov[163] wrote the most thorough examination of air superiority. He was convinced that current technology required a re-assessment of the prevailing idea that fighters provided air superiority by 'securing relative freedom of action for one's own air force and constraining the actions of the enemy's'. Ionov broke down the air superiority battle into tactical, operational, and strategic levels. At the strategic level, he saw a battle for quantitative and qualitative superiority, and thus suggested heavy bombing raids on factories – if the quality of night piloting and bombing accuracy was up to the task. Ionov defined 'tactical superiority' as superiority within 6 to 8 kilometres, a severely limited zone defined by the distance at which he expected a single pilot to be able to detect enemy aircraft.[164] Ionov defined operational air superiority in terms of land operations:

> To gain air superiority in a given operation means to gain, for the entire period of the operation, freedom of action for one's own air force and to exclude or significantly constrain the activity of the enemy air force in supporting its ground forces. Thus this superiority will be temporary (for the time of the conduct of the operation) and local (in the region of active operations). It can be achieved through massed air power, at the cost of weakening other less important axes. Falling short of the enemy in the battle for strategic air superiority, concentrated force on selected axes at the time of the operation makes it possible for the weaker side to gain air superiority. The frontage of such a superiority will be approximately that of an Army having an active mission and can be calculated at 30-50 km. The depth of such a superiority is defined by the radius of necessary combat work by the Air Force in support of the Army, that is, 200-300 km.[165]

Arguing, as had Khripin and Lapchinskii, that attacks on airbases were the best means of attaining operational air superiority, Ionov specifically suggested attempting attacks on enemy airbases the night before a major ground operation. However, fighters had a significant role to play, and he also suggested making fighter bases the primary

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[163] Despite his visibility as a writer in the 1930s, P. P. Ionov (who also apparently signed works as Ionov and P. Ionov) remains a remarkably shadowy figure – especially because his only known posting came in August 1941, when Major-General (Aviation) P. P. Ionov was appointed Chief of Staff of the Red Army's Airborne Troops. Beyond this and his written work, his origin, career, and fate are unknown. (Erickson, *Road to Stalingrad*, p. 65. Ionov is completely absent from Glantz's *History of Soviet Airborne Forces*, possibly due to its focus on the Army, not the Air Force.)

[164] P. Ionov, 'Bor'ba za prevoskhodstvo v vozdukhe', (*Vestnik vozdushnogo flota*, No. 4, 1932, pp. 6-8), pp. 6-8.

[165] Ionov, 'Bor'ba za prevoskhodstvo v vozdukhe', p. 7.

targets of the initial attacks, in order to ease subsequent stages in the battle for operational and tactical air superiority.[166]

Despite the slowly growing debate over the ability of fighters to defeat bombers, A. Kozhevnikov displayed no doubts that fighters had a role to play in his textbook *Taktika istrebitel'noi aviatsii* [*Tactics of Fighter Aviation*], published in 1933:[167]

> The battle for [tactical] air superiority is obtained by:
> 1) the massed and sudden entry into action of all types of aviation, especially fighters, in order to gain initial success in seizing air superiority over the entire depth of the developing operation with a minimum of effort, and to prolong its retention;
> 2) the organization of close cooperation between fighter aviation and other types of aviation and means of air defence, in the interests of cooperation in battling the aerial enemy over the territory of both sides;
> 3) the use of fighter aviation throughout the depth of the most important operational axis in greater strength than the enemy deploys (a 2:1 superiority in numbers). By means of fighter aviation superiority can be gained only for a relatively small piece of land (20 – 30 km) and for a time, limited to that time in which the fighters are present.[168]

Kozhevnikov wrote that operational air superiority could only be gained by bombing enemy airfields, however, and strategic superiority required bombing factories: Ionov's delineations were coming into use.[169]

Kozhevnikov had also noted the importance of the role of bombers along with the role of fighters. This idea of the importance of bombers gained more support as a result of the Air Force wargames run in March 1934 by Iakov Alksnis, Chief of the Air Force. These wargames served to confirm that air superiority could be won through strikes, particularly by heavy bombers, on enemy airbases during the initial period of a war.[170] While the model used to resolve the effect of bomber attacks is unclear at seventy year's remove, it presumably proved convincing to the participants.

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[166] Ionov, 'Bor'ba za prevoskhodstvo v vozdukhe', pp. 7-8.
[167] A. Kozhevnikov, *Taktika istrebitel'noi aviatsii*, (Moscow: Voenizdat, 1933); and A. Kozhevnikov, *Taktika istrebitel'noi aviatsii: uchebnik dlia letnikh shkol VVS RKKA*, (Moscow: Voenizdat, 1933). The former is softcover, and shorter, while the latter is hardcover and has more text plus far more illustrations. The material covered is largely the same, but the text is not quite identical.
[168] Kozhevnikov, *Taktika istrebitel'noi aviatsii*, p. 19.
[169] Kozhevnikov, *Taktika istrebitel'noi aviatsii: uchebnik*, pp. 5-7.
[170] Migulin, *Teoriia i praktika*, p. 29, 36.

During increasingly strident debates in 1935, advocates of bomber self-defence appear to have begun to win their argument against advocates of fighter's manoeuvre superiority. As a result, the power of the bomber came very much to the fore. Absolute air superiority – called 'mastery of the air' (gospodstvo v vozdukhe) by the bomber advocates, in imitation of Douhet (whose Command of the Air was translated into Russian as *Gospodstvo v vozdukhe* in 1926)– also came to the fore as the primary mission of the air force.[171]

On one end of the spectrum of bomber advocates, Khripin argued that air superiority was the primary mission of the air force, but only as a means to an end, those ends being the operational and tactical support of ground forces.[172] The most vocal and radical of the bomber advocates, however, was A. Algazin. Algazin's previous work, such as *Obespechenie vozdushnikh operatsii* (*Securing Aerial Operations*, 1928)[173], and *Aviatsiia v reide MMS* (*Aviation in the Raid by Motor-Mechanized Forces*, 1933)[174] had been firmly grounded in reality. His work on the textbook *Taktika bombardirovochnoi aviatsii* (*Tactics of Bomber Aviation*, 1934)[175] and work on light bomber formation defensive tactics against fighters[176], combined with the republication of Douhet into Russian, appear to have changed his mind. (While Douhet's *Mastery of the Air* appeared in Russian in 1926, and *The War of 19xx* in 1931, the 1926 edition of *Mastery of the Air* was criticized as a poor and severely abridged translation, while *The War of 19xx* had been translated from a German translation, not from the original Italian. At the end of

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[171] A. Algazin, 'Dzhulio Due "Gospodstvo v vozdukhe"', (*Vestnik vozdushnogo flota*, 6, 1936, pp. 14-24), p. 14.
[172] V. Khripin, 'O kharaktere boevikh deistvii aviatsii', (*Voina i revoliutsiia*, No. 1, 1935, pp. 63-73), pp. 63-73.
[173] A. S. Algazin, *Obespecheniie vozdushnikh operatsii*, (Moscow: Gosizdat, 1928), and examined in the previous chapter.
[174] A. Algazin, *Aviatsiia v reide MMS*, (Moscow: Voenizdat, 1933), and a prior article, A. Algazin, 'Aviatsiia v reide MMS', (*Vestnik vozdushnogo flota*, No. 10-11, 1931, pp. 14-34); these will be examined a bit later in the section on ground support.
[175] The publication of this work was announced in *Vestnik vozdushnogo flota*, No. 10, 1934, p. 60.
[176] A. Algazin, 'Boi legkobombardirovochnoi aviatsii s vozdushnim protivnikom', (*Vestnik vozdushnogo flota*, No. 3, 1934, pp. 3-15), A. Algazin, 'Boi legkobombardirovochnnoi aviatsii', (*Vestnik vozdushnogo flota*, No. 6, 1934, pp. 5-10).

1935, a combined volume was published based on an Italian Defence Ministry selection of Douhet's works published in 1932, edited by Khripin and entitled again *Mastery of the Air*.)[177]

In 1935 Algazin reviewed P. Ionov's *Obshchaia taktika voennikh vozdushnikh sil* (*General Tactics of Air Forces*), published the previous year.[178] Only tangentially a review of Ionov's book, the article served largely as a platform for Algazin to propound a Douhet's views on aerial warfare. Algazin argued against Lapchinskii, who, among others, had not supported the notion of mastery of the air. While Ionov supported the idea in principle, Algazin took him to task for failing to treat it as not only eminently possible, but extremely desirable. He foresaw the day of the heavy bomber gaining mastery of the air through the destruction of both enemy airbases and factories, and confidently predicted gigantic 'fortress aerodromes' would have to be built near factories in the deep rear protected by belts of flak, fighters, and ground troops (to protect against deep raids and aerial assault). These would serve as bases for the decisive arm of aviation, heavy bombers, to sally forth and win mastery of the air, presumably by trying to attack similar bases in the enemy rear.[179] Algazin's conversion to Douhet had temporarily far-reaching results in the Soviet debate on airpower, and brought air superiority, bomber survivability, the actions of the air force in the initial period of war, and strategic bombing into one combined argument. Before continuing to examine Algazin's new views and their impact, we will shift backwards and look at the debate on the initial period of war and strategic bombing up through 1935.

In the previous chapter, we saw that the Soviets thought the Air Force could have a distinct role to play in the initial period of war, given sufficient bomber strength: that of

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[177] A. Algazin, 'Dzhulio Due "Gospodstvo v vozdukhe"', (*Vestnik vozdushnogo flota*, 6, 1936, pp. 14-24), p. 14.
[178] A. Algazin, 'Review: P. Ionov, *Obshchaia taktika voennikh vozdushnikh sil*, Voengiz, 1934', (*Vestnik vozdushnogo flota*, No. 8, 1935, pp. 49-55.)
[179] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', pp. 52-53.

conducting operations to disrupt enemy mobilization and deployment. In the 1920s, the heavy bombers needed for this were lacking. In the 1930s, the bombers were becoming available. Even in 1929, some writers were looking forward to the results of the Five Year Plan and a larger Air Force. In an article the editors of *Vestnik vozdushnogo flota* noted was supported by 'purely theoretical' points, S. Mezheninov called for the Air Force to concentrate on a limited 150 to 250 km sector of the European front in the initial period of a war, covering the other 750km of the front with a screen of fighters and air defence artillery. On this axis, part of the Air Force would cooperate with the cavalry screen, light bombers would disrupt enemy railroads, and a strategic air group of heavy bombers would strike repeatedly at enemy air bases to gain air superiority. Having gained air superiority, disrupted enemy deployment, and protected friendly deployment, the Air Force would continue to direct its actions to ensure the success of the ground operation.[180]

Mezheninov's article was radical only in proposing that the Air Force might conduct the separate operations with light and heavy bombers, instead of restricting its activity to direct combat support of border forces. Despite being the most vocal exponent of separate Air Force operations,[181] Mezheninov still concentrated on providing support for the ground war. Lapchinskii actually went further in 1929, suggesting that in the initial period of war, the Air Force had to be considered an independent element of the military, because of its three missions in the initial period, deep strike, defence, and supporting units at the border, only the latter was directly connected to ground forces. The need to coordinate these efforts meant that the Air Force command needed to be concentrated at the level of military districts or Fronts. This concept for command

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[180] S. Mezheninov, 'Boevaia aviatsiia', (*Voina i revoliutsiia*, No. 1, 1929, pp. 14-31), pp. 27-31. Quote from editors on p. 14.

[181] Editor's comment on: S. Mezheninov, 'Boevaia aviatsiia', (*Voina i revoliutsiia*, No. 1, 1929, pp. 14-31), p. 14.

arrangements seems to have been little debated beyond a single article criticizing Lapchinskii (and thus, implicitly, Mezheninov) for diverting effort from ground support, but neither were they acted on.[182]

The topic popped up again briefly in 1932, despite the *chistka*. Again, the main thread was that of supporting the ground forces, but opinion had shifted away from direct support to support through disruption of the enemy's mobilization, concentration, and deployment. In essence, Mezheninov's proposals of centering the actions of aviation on separate operations in the initial period of war had become the standard view. These separate actions, however, were expected to have a fairly direct impact on the course of the ground war. In *Vozdushnie sili v boiu i operatsii* (*The Air Force in Battles and Operations*), Lapchinskii examined the prospect of launching a total war (besposhchadnaia voina, literally 'merciless war') by bombing enemy cities. The book's editors criticized the notion of city-busting, noting that bombing cities 'as cities' was 'politically absolutely impossible' because it would mean striking the Soviet Union's working-class supporters. Even Lapchinskii seems to have included the discussion largely to deride it; he saw it as useful only in the event that the bombardment could actually force the enemy to surrender, prevent the enemy from entering into the war, or as retaliation for similar strikes by the enemy. Furthermore, Lapchinskii noted that very powerful bomber aviation would be needed, and concluded:[183]

> At the current stage of the development of air forces, it is more sensible to set oneself the more concrete goals connected with strategic concentration and deployment, taking as the main mission the slowing of the enemy's concentration and deployment. Thus we turn from this short analysis of the possibility of total war to the more realistic questions of our time, connected with the use of aviation in the initial period of war.[184]

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[182] A. Lapchinskii, 'Deistviia aviatsii v nachalnom periode voini', (*Voina i revoliutsiia*, No. 6, 1929, pp. 55-66), pp. 55-57, 66. Rebuke: Viktor Novitskii, 'Deistviia aviatsii v nachalnom periode voini', (*Voina i revoliutsiia*, No. 9, 1929, pp. 23-31). On organization, Migulin, *Teoriia i praktika*, pp. 106-107.

[183] I. Vilin, 'Osnovnie printsipi raboti shturmovikov', (*Vestnik vozdushnogo flota*, No. 5, 1932, pp. 16-17), p. 16 discusses the role of the Air Force in the initial period of war; A. Lapchinskii, *Vozdushnie sili v boiu i operatsii*, (Moscow: Gosizdat, 1932), pp. 113-122; comment by editors, p. 121.

[184] A. Lapchinskii, *Vozdushnie sili v boiu i operatsii*, (Moscow: Gosizdat, 1932), p. 122.

Lapchinskii directed the main strike mission in the initial period of war against the enemy's railroad network and airbases to provide the greatest results in disrupting the enemy's deployment. The 'maximal program' included an aerial war against the enemy's morale and economic system, but even in this case, the primary target was the enemy's railroads, and closely connected to success on the land. Lapchinskii's conclusion to the entire section on the air force in the initial period of war was: 'On the background of this aerial war we create favourable conditions for air-ground operations on the land war front.'[185]

The question of 'strategic bombing' – a term the Soviets very rarely used – had been under some debate before Algazin's sudden and vocal conversion to Douhet. Prior to this, Douhet had been routinely dismissed as a fantasist and the value of bombing factories or cities generally denied. Intertwined into the debate were the attitudes, discussed above, about aerial combat, bombing accuracy, air superiority, and the actions of the air force in the initial period of war. Furthermore, as noted above, Soviet terminology was somewhat imprecise in this field, with the term 'separate operations' often covering a wide variety of activities ranging from close air support to air interdiction campaigns only loosely tied to ground operations.

While some called for heavy bomber attacks on factories, this often occurred in the context of a laundry lists intended to define the potential targets of bombers as widely as possible in order to emphasize their versatility, without drawing any distinctions between the importance or priority of the classes of target. However, in 1929 Algazin suggested that factories, railroads, and airbases were the primary targets for heavy bombers.[186] More directly in favour was Mezheninov, who suggested the formation of a 'strategic group of combat aviation', consisting of 40 heavy bombers (each with 2000kg

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[185] Lapchinskii, *Vozdushnie sili v boiu i operatsii*, p. 122-138; quotes on p. 138.
[186] A. Algazin, 'Voprosy dislokatsii aviachastei', (*Vestnik vozdushnogo flota*, No. 9, 1929, pp. 8-12), p. 11.

of bombs), 18 cruisers, and 110 light bombers, and capable of penetrating 500km. This strategic group would bombard targets vital to supplying the war effort, such as electrical power plants, or that were vital to the development of land operations. This independence was tempered, however, by Algazin's requirement that any of these separate actions must be conducted 'in the spirit of the ground campaign'. Thus, his strategic air group would pound enemy airbases in the initial period of war in the interests of the war effort as a whole. If the strategic group were then to turn to destroying factories, he argued it would be necessary to figure out when the bombing activity was likely to have an impact on ground operations, as it would be worthless if it would not.[187]

Eyeing the development of heavy bombers and theories such as Douhet's in the West, the Soviets feared Western bombing of the Soviet Union. In 1929, Alksnis predicted that the Soviet Union would face heavy bombardment west of a line along Archangel – Moscow – Kharkov, with consequent disruption of command centres, railroads, mobilization centres, and possibly cities.[188] However, as noted above, there were consistently calls against the bombing of cities, usually on political grounds.[189] Moreover, there were doubts, notably from Lapchinskii, about the ability of bombers to actually hit their targets,[190] and, more importantly, doubts that the enemy's factories and cities should be the primary targets of heavy aviation. Thus even Khripin, no enemy of heavy aviation, stated in 1931 that,

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[187] S. Mezheninov, 'Boevaia aviatsiia', (*Voina i revoliutsiia*, No. 1, 1929, pp. 14-31), pp. 15-20, 25-31; quote on p. 26.
[188] Ia. Alksnis, 'Nachal'nii period voinii', (*Voina i revoliutsiia*, No. 9, 1929, pp. 3-22), pp. 18-20.
[189] For example: Viktor Novitskii, 'Deistviia aviatsii v nachalnom periode voini', (*Voina i revoliutsiia*, No. 9, 1929, pp. 23-31), p. 24; and editorial comment in the book: Lapchinskii, *Vozdushnie sili v boiu i operatsii*, comment by editors, p. 121.
[190] A. Lapchinskii, 'Operativnii raschet bombardirovaniia zheleznikh dorog', (*Vestnik vozdushnogo flota*, No. 1, 1930, pp. 10-14), p. 10; and an extended argument in A. Lapchinskii, *Bombardirovochnie rascheti*, (Moscow: Voenizdat, 1935).

> All types of offensive aviation (bombers, attack, and fighters) should seek to destroy enemy air power by various means, with the primary work being attacks on enemy airfields and air bases.[191]

Air superiority remained a priority in 1934 when Khripin and Tartarchenko wrote on 'Aerial War':

> The combat activity of the air force is organized and conducted in the overall interest of the war, being directed to the accomplishment of the following concrete military missions:
>
> 1) by means of suppressing the aerial enemy and air defence in the theatre of military activity and in the depths of the enemy countries, create conditions easing the freedom of action of one's own air force, army, and navy;
>
> 2) by offensive actions and by organized defence of the most important regions in friendly territory, ensure aerial security for the population of the country;
>
> 3) attack enemy population centres from the air to impede the supply of the combat front, reduce the morale of the resisting population, and speed up the growth of class war;
>
> 4) speed up the defeat of the enemy military by combined actions with the army and navy.[192]

Yet this relatively radical beginning, listing cooperative activity last, and the first three objectives being directed towards activity that would be classed as separate or even independent and suggesting the bombing of cities, was not entirely supported by other parts of the article. After describing Western aerial doctrines (categorized as Douhet and Fuller advocating of direct action on the enemy populace, while Nissel and Seekt favored destruction of the enemy's military forces), they introduced the 'Air Army' or 'Separate Air Force' as the main strike arm of the Air Force. Containing the bulk of the Air Force's combat power, it would conduct separate and independent missions against three sets of targets, in order of importance: the enemy air force; enemy lines of communications; and enemy land and sea targets of military, political, or economic value. In discussing these target sets, the destruction of enemy railroads out to 250km from the front line was

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[191] V. Khripin, 'Ocherednie zadachi boevoi podgotovki VVS', (*Vestnik vozdushnogo flota*, No. 1, 1931, pp. 2-3), p. 2.

[192] V. Khripin, E. Tartarchenko, 'Vozdushnaia voina', (*Vestnik vozdushnogo flota*, No. 4, 1934, pp. 4-7), pp. 4-5. The article was pre-published in *Vestnik vozdushnogo flota* for comment, but intended for publication in the *Soviet Military Encyclopedia* (see editor's note, p. 4.)

considered very important. After briefly noting the necessity of a detailed target study if deep strikes on the enemy economy were to have an effect, they moved to discussing operations in support of armies and fleets.[193] Thus, the independent, or 'strategic bombing' aspect of the mission seems to have been relatively less important. This was fully in keeping with other articles written at about the same time. For example, at the end of 1934, F. Arzhenukin[194] extolled the virtues of heavy bombers (and included a vitriolic polemic against Lapchinskii for doubting their ability to defend themselves against fighters), but nonetheless considered the main mission of heavy aviation to be gaining air superiority through strikes on enemy airbases and called Douhet's works 'fantasy'.[195] The emerging consensus position was probably closest to that expressed by Khripin at the beginning of 1935, that the Air Force 'should not desert the army', but had to be fully prepared to engage in separate and independent actions as well, since the outcome of the ground war depended on the success of the battle for mastery of the air.[196]

Into this emerging consensus, Algazin's article of August 1935 seems to have come as a bombshell. Ostensibly a review of Ionov's *Obshchaia taktika voennikh vozdushnikh sil*, the bulk of the review was a polemic by Algazin regarding independent actions by air forces. Ionov's book concerned itself with the tactics of large air force units, considering general tactics to be the link between air force operational art and tactics. Algazin used the topic as a springboard. Commenting that Soviet literature had mostly looked at aviation within the limits of ground operations or direct support, he declared [all emphases in original in the following quotes]:

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[193] Khripin, Tartarchenko, 'Vozdushnaia voina', pp. 5-6.
[194] Fyodor Konstantinovich Arzhenukin graduated from flight school sometime in the 1920s. Posted to command the the Air Force Command and Staff Academy (Monino) in October 1940, by the outbreak of war in 1941 had risen to be one of three Air Force Chiefs of Staff, at which point he disappears, but may well have been shot in the summer of 1941. (Shumikin, V. S. , *Sovetskaia voennaia aviatsiia,* pp.126, 224, 231; Zolotarev, V. A., et al., *Materiali soveshchaniia 23-31 dekabria 1940 g.*, p. 376).
[195] F. Arzhenukin, 'Deistvitel'no li burzhuaznie armii otkazivaiutsia ot tiazhelikh bombovozov', (*Voina i revoliutsiia*, No. 11-12, 1934, pp. 61-63); polemic p. 63; 'fantasy' p. 62.
[196] V. Khripin, 'O kharaktere boevikh deistvii aviatsii', (Voina i revoliutsiia, No. 1, 1935, pp. 63-73), p. 73.

> *...independent operations of the air force are now primary and decisive, requiring the greatest attention in the study of new forms of the combat employment of the air force.*[197]

Ionov called on the Air Force to work out the tactics of deep independent operations, and Algazin complained that Ionov had not gone far enough because Ionov had not undertaken a detailed study of the problem. Given Algazin's contention that

> ... the fundamental nature of aviation – *its ability to penetrate deep into the enemy disposition – for landing blows on the population centres of the enemy country*....[198]

Algazin argued that Ionov therefore

> should have made a more concise and sharp *conclusion* – not that independent operations are *possible*, but that *they form the main and decisive link in the combat employment of air forces*, especially in the initial period of war, that air forces are now numerically and qualitatively sufficient and will in the next few years be fully capable of such actions (which all the same will in no way make it the sole means of warfare), that strikes should be directed on *political centres* or *economic objects* in dependence on the concrete situation, that the choice of target of these strikes will be the most *important and weak links* in the system of the enemy country, that the stronger the enemy is in political, economic, and military terms, the wider should be the extent of these actions, and finally that independent operations only bring results when they are conducted on a massive scale – by powerful aerial armies – to which, as it happens, the capitalist governments are moving, first and foremost Germany.[199]

Algazin also argued the need to accept the concept of mastery of the air. While Ionov thought mastery of the air was probably impossible to gain, Algazin argued that it was not only both desirable and possible, but that its scale must be defined on an area much wider than that of the ground operation Ionov mentioned, instead defining it by the abilities of the opposing air forces. By dividing mastery into tactical, operational, and strategic levels, Ionov drew Algazin's comment that 'only through gaining strategic

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[197] A. Algazin, 'Review: P. Ionov, Obshchaia taktika voennikh vozdushnikh sil', Voenigiz, 1934', (*Vestnik vozdushnogo flota*, No. 8, 1935, pp. 49-55), p. 49, emphasis in original.
[198] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', p 50, emphasis in original.
[199] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', p. 51, emphasis in original.

mastery can operational mastery be gained' and Algazin went on to speculate about the 'fortress aerodromes' which we have discussed earlier.[200]

The theorist who came in for the most knocks after Algazin's review was Lapchinskii, though Algazin's criticism of Lapchinskii was relatively gentle. Algazin treated Lapchinskii's *Vozdushnie sili v boiu i operatsii* as representative of older views, but Algazin also claimed that Lapchinskii had changed his mind.[201] Perhaps Algazin's criticism was muted because they were friends, hinted at in Algazin's thanks to Lapchinskii for assistance in preparing a second edition of his book *Aviatsiia v sovremennoi voine* (*Aviation in Modern War*) printed in 1936; certainly they were colleagues at the Zhukovskii Air Force Academy, and had worked together on the editorial board of *Vestnik vozdushnogo flota*. In any event, Arzhenukin's criticism of Lapchinskii in the 1934 article noted above was much harsher; and in July of 1935, a trio of authors lead by Ionov wrote a scathing review of Lapchinskii's 1934 book, *Vozdushnii boi*, railing against Lapchinskii's arguments that single-seat fighters were still a threat to bombers and concluding that it had been a grave mistake to print the book without editorial comment indicating that parts of the book that were doubtful, arguable, or 'contradictory to the actual state of the Air Force'.[202] However, the tendency towards personal attacks did not continue, and Lapchinskii continued both to publish and to disagree with much of what other theorists were writing.

Algazin's conversion to Douhet marked the start of the time of strength for the advocates of heavy bombers in the USSR, a high point lasting though 1936 and into early 1937. Tukhachevskii, in 1934, had claimed that '...any country, possessing strong

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[200] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', pp. 52-53, quote p. 53, emphasis in original.
[201] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', pp. 49, 51. Lapchinskii's *Taktika aviatsii* also comes in for criticism (p. 49).
[202] Ionov, Shcherbakov, Chaikin, 'Review: A. Lapchinskii, *Vozdushnii boi*, Gos. Voen. Izdat, 1934', (*Vestnik vozdushnogo flota*, No. 7, 1935, pp. 46-53), quote on p. 53.

aviation, can break the strategic concentration of the enemy',[203] and the first of three Special Purpose Air Armies (AON, Aviatsionnaia armiia osobogo naznacheniie) was formed in 1936, directly subordinate to the High Command and commanded by Khripin. Over the next two years, another two of these formations were created, each comprising 150-170 heavy bombers, 50 light bombers, and 50 fighters, intended to provide a strike force for separate operations.[204] *PU-36* specified that aviation was to conduct both ground support and separate operations, and the *Temporary Instructions on the Separate Actions of the RKKA Air Force* instructed that both Front and High Command aircraft were to be used in separate strikes.[205] The 1936 manoeuvres, in which over 700 aircraft from the Special Purpose Air Army and several military districts took part, demonstrated that the struggle in the air would require that several Fronts work together, with overall direction and reinforcement from the High Command. Therefore, the AON were to be used to reinforce Fronts on the main axis.[206] The AON were thus the first Soviet Air Force operational formations, providing the Soviets with the ability to shift their forces across the entire front to create points of maximum effort, a concept Novikov would revive in 1942. On a practical level the activity of these formations remained connected to the Army, but on the theoretical level, some in the Air Force moved farther afield.

Part of the process was a renewed official interest in Douhet, evidenced by the 1935 publication of a volume of his work under the title *Mastery of the Air* (*Gospodstvo v vozdukhe*). Khripin, then the Air Force Chief of Staff, praised Douhet for writing works of great practical and theoretical interest, both edited the Soviet edition and wrote its introduction. Reviewing this compilation, Algazin began by asserting that, 'We must

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[203] Migulin, *Teoriia i praktika*, p. 29, quoting from M. N. Tukhachevskii, *Kharakter pogranichnikh operatsii*, (TsGASA, fond' 37977, opis' 3, delo 604, list 332).
[204] Migulin, *Teoriia i praktika*, p. 25. Vasil'ev, *Long-Ranged, Missile Equipped*, p. 20, claims Khripin is the first commander.
[205] Migulin, *Teoriia i praktika*, pp. 35 (*Temporary Regs*) and 38 (*PU-36*).
[206] I. V. Timokhovich, *Operativnoe iskusstvo Sovetskikh VVS v Velikoi Otechestvennoi voine*, (Moscow: Voenizdat, 1976), pp. 15, 242-243. Timokhovich cites the multi-front conclusion from: Arkhiv MO SSSR, fond 35, opis' 29372, delo 16, list 110.

study and know Douhet.' Algazin declared Douhet's work fundamentally correct, albeit needing interpretation to avoid 'vulgar' understanding, and in spite of flaws in Douhet's poor appreciation of practical problems, his tendency to 'overpolemicise', and his overoptimism regarding the possibility of winning the war in a single blow.[207]

The growing faith in the effectiveness of bombers folded into the ongoing debate on how to gain air superiority. The preferred method was strikes on enemy airbases, and studies began to appear with specific recommendations on how these strikes might be conducted. Most expected a massive operation, involving fighters, bombers, and sometimes, close attack aircraft. Some, such as Arzhenukin and Ionov, saw the problem largely in terms of bombers and tended to assume that detection of enemy airfields would be relatively simple. They also assumed, like Algazin, that bombers were accurate and that the results of strikes would be difficult to repair. They therefore suggested that one key method of defence would be continual shifting of aircraft to different airbases, so that the enemy could not manage to target the relevant airbases in a timely manner.[208] Others worried more about the problem of reconnaissance, noting that manoeuvres both in the Soviet Union and abroad had demonstrated that camouflaged airbases were difficult to find, but still tended to assume that once discovered, the bases could easily be effectively engaged from the air.[209] All, however, tended to agree that fighters were not the primary means of gaining air superiority, though some did argue in favour of the ability of massed

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[207] A. Algazin, 'Dzhulio Due, '*Gospodstvo v vozdukhe*'', (*Vestnik vozdushnogo flota*, No. 6, 1936, pp. 14-24), pp. 14-24; quotes from pp. 14, 19, and 24 respectively.
[208] F. Arzhenukin, 'Aerodromnii manevr', (*Vestnik vozdushnogo flota*, No. 4, 1936, pp. 23-27); F. Arzhenukin, 'Deistviia tiazheloi bombardirovochnoi aviatsii po aviabazam protivnika', (*Vestnik vozdushnogo flota*, No. 9, 1936, pp. 5-7); P. Ionov, 'Gospodstvo v vozdukhe`, (*Voina i revoliutsiia*, No. 5-6, 1936, pp. 74-87).
[209] Pestriakov, 'O bor'be za prevoskhodstvo v vozdukhe', (*Vestnik vozdushnogo flota*, No. 4, 1935, pp. 6-7); Zhigarev, 'Bombardirovochnie deistviia po aerodromam protivnika', (*Vestnik vozdushnogo flota*, No. 7, 1936, pp. 9-12).

fighters to ward off attacks.[210] In early 1937, V. Kuznetsov argued that the generally accepted primary role of the Air Force was:

> *The main area of combat activity of modern aviation is the independent aerial operation, directed to the attainment of mastery of the air and to the breaking of the resistance of the enemy nation by means of destroying population centres, the disruption of systems of military supply of land, naval, and air forces, and the destruction of troops and fleets far from the battlefront.* The accomplishment of these missions is laid on the aerial army [vozdushnaia armiia], subordinated to the high command, the main strength of which is heavy bombers and cruiser aviation.[211]

Kuznetsov's assertion that this was generally accepted is debatable; but on the whole there was increasing agreement that the Air Force was to make a concentrated blow, on the outbreak of war, against the enemy's air force, attempting to bomb the enemy air force at its bases, thereby damaging it sufficiently to gain air superiority. Views diverged on how this blow was to be mounted, how much force would be required to make it work, and what should be done with the subsequent superiority. As we have seen above, some supported the notion of bombing enemy factories and cities. Others seem to have largely avoided the issue, sticking close to the formulations of various field regulations, which called for separate actions in support of ground operations. Nonetheless, the Soviets were moving towards a modern understanding of offensive counter-air operations. As will be discussed in the next chapter, poor results from offensive counter-air in Spain caused the Soviets signifcant doubts about the validity of this approach, and their debate on the topic continued until the Germans provided a direct practical demonstration in 1941.

The main voice against bombing cities and factories was Lapchinskii, whose continued and dogged pursuit of his own point of view, fairly self-consistent over the years, indicates either considerable personal courage or faith in a patron, given the

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[210] Nikitin Sokolov, 'Otrazhenie naleta VS protivnika na nashu territoriu v nachale voini', (*Vestnik vozdushnogo flota*, No. 4, 1936, pp. 27-28).
[211] V. Kuznetsov, 'Sovremennie vozdushnie voruzheniia', (*Voina i revoliutsiia*, No. 2, 1937, pp. 60-74), p. 63. Emphasis in original.

fortunes of the Soviet military in the 1930s: a small purge in 1930, the party *chistka* in 1932, and the purge of 1937, each of which produced a distinct temporary reduction in the number of articles that were in any way controversial.[212] Regardless of the cause, Lapchinskii was a lone voice in continuing to suggest that bombers were not especially accurate, particularly from high altitudes: 'From the stratosphere, it is doubtless possible to hit the ground.'[213] He also suggested that

> …attacks on objects in the state rear will cause the enemy certain losses, but in such situations it is possible to find targets whose destruction will produce more meaningful results.[214]

He asked specifically in this regard about a reprise of 1914: with the Germans advancing on Paris, was it better for the French Air Force to bomb German factories, or to provide the French Army with direct support? – a question perhaps prescient, in view of the doctrinaire refusal of the RAF, in May 1940, to divert Bomber Command away from a planned campaign against the Ruhr to attack the German crossing at Sedan.[215] Lapchinskii argued that the fundamental principle of Air Force activity was, '*Ground forces must not be deserted by aviation in their day of need*'.[216] Given this, and the impossibility of bombing everything, he argued that bomber aviation should concentrate on enemy logistics, command, and mobility, and Lapchinskii devoted a large part of *Bombardirovochnaia aviatsiia* (*Bomber Aviation*) to an analysis of an aerial operation

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[212] Regarding the purge in 1930, see: B. V. Sokolov, *Krasnaia armiia v mezhvoennii period (1921 – 1941 gg.)*, (Moscow: Znanie, 1990; the 7/1990 issue of *Zashchita otechestva*); ~5,000 officers were arrested, and most later released.

[213] A. Lapchinskii, 'Osnovnie voprosi sovremennoi aviatsii', (*Voina i revoliutsiia*, No. 3-4, 1937, pp. 85-95), pp. 90-91; A. Lapchinskii, *Bombardirovochnaia aviatsiia*, (Moscow: Voenizdat, 1937), pp. 54-99, 231, 430-431; quote p. 430.

[214] Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 45.

[215] Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 45; Roderick MacLeod & Denis Kelley, eds., *The Ironside Diaries*, (London: Constable, 1962), p. 304, Terraine, *Right of the Line*, pp. 137-141. My thanks to Bill Buckingham for information on the May 1940 decision.

[216] Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 47. Emphasis in original.

designed to prevent railroad traffic over 700km of track in an area 120km wide and up to 400km deep as the best means of fulfilling the basic mission of bomber aviation.[217]

Attitudes towards heavy aviation, fighters, and strikes on enemy airbases underwent significant changes at the start of the Spanish Civil War, then just beginning. Attitudes towards ground support, and its necessity, did not. Everyone agreed on the necessity of supporting the ground war in some manner, from Lapchinskii, quoted above, to Algazin, who, even in his polemics in favour of bombing the deep rear, agreed that the Air Force's movement towards independent operations 'cannot in any way call for the *slightest reduction* in the numbers of combat aviation in armies and corps.'[218] However, there was not a unity of views on the methods of supporting ground forces. The debates concerning the use of aircraft in support of ground operations fall into two categories: the tactical and the operational. While the tactical debates will largely be ignored below, one aspect of them is important enough to warrant a look. The operational level was less discussed, but involved some key concepts.

The tactical argument of note concerned the means of controlling air support, as exemplified by the issue of radios. The debate on radios was in many respects simple. Radios were expensive to produce, and relatively heavy. Did they produce a tactical effect commensurate with the costs in money and aircraft performance?

This appeared most often in discussion of the actions of close attack aircraft (shturmoviki). It was generally accepted that these would attack en masse, at low level. How, then, were they to find their targets? P. Zhigarev expressed a common opinion in 1932: a reconnaissance aircraft would fly out, detect an approaching column of enemy troops, and note its rate and direction of march. Then the aircraft would fly back to its base, present a report, and the shturmoviki would fly out, go to the projected location, and

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[217] Lapchinskii, *Bombardirovochnaia aviatsiia*, pp. 42-53, 426-437.
[218] Algazin, 'Review: P. Ionov, *Obshchaia taktika*', p. 51. Emphasis in original.

bomb the target, two hours after its initial detection.[219] This method presented some obvious problems. If the enemy did not follow the projected path, the aircraft would have to re-conduct the reconnaissance in order to find the target, and the faster the target could move, the worse the problem of detection would be. Additionally, the strike might overfly the target while searching, thereby giving the target warning of the incoming attack and negating the surprise which (along with accuracy) was seen as one of the cardinal advantages of low-level attack.

To the modern eye, radio provides the obvious solution to this problem. While proposed, radio did not gain universal acceptance, and the methods suggested for its employed varied. Some simply stated radio was a solution: an accurate but unhelpful observation. Others presumed that radio would be used so that ground forces could communicate with their headquarters, where an air force representative would be stationed, who could in turn communicate with the aircraft via radio.[220] Others presumed that aviation would be acting deep enough to be outside the observation of ground forces, and proposed that the reconnaissance aircraft guide in the strike via radio, but this notion was rare.[221] Even more rare were suggestions for direct coordination by radio between ground and air; Kukhsha is unique in having suggested this in a detailed article outlining methods for cooperation between tanks and aircraft, utilizing the aircraft to suppress or destroy anti-tank batteries designated by the tanks, with two-way communication by radio and use of signal flares and smoke by the tanks.[222] While Lapchinskii agreed,[223] the 1935

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[219] P. Zhigarev, 'Ataka shturmovikami motomekhanizirovannoi kolonni', (*Vestnik vozdushnogo flota*, No. 5, 1932, pp. 8-14.)

[220] A. K. Mednis, *Taktika shturmovoi aviatsii: Uchebnik dlia letnikh shkol i stroevikh chastei VS RKKA*, (Moscow: Voenizdat, 1935), pp. 64-66; Algazin, 'Aviatsiia v reide MMS', pp. 22, 27; Algazin, *Aviatsiia v reide MMS*, p. 90, V. Khripin, 'Iz opyta Bobruiskikh manevrov', (*Vestnik vozdushnogo flota*, No. 10-11, 1929, pp. 4-8), p. 6.

[221] M. Smirnov, 'Vzaimodeistvie shturmovogo soedineniia s razvedivatel'noi aviatsii', (*Vestnik vozdushnogo flota*, No. 6, 1933, pp. 10-11), p. 11.

[222] Kukhsha, 'Vzaimodeistvie tankov DPP i DD s aviatsiei i artileriei pri prorive oboronitel'noi polosi protivnika v manvrennoi voine', (*Voina i revoliutsiia*, No. 1, 1932, pp. 1-12), pp. 7-8.

textbook on close attack aviation ignored radio.[224] In addition, several calls for two-way radios in aircraft, which laid out the significant tactical advantages in aerial combat, were largely ignored and on some occasions disputed.[225] Regardless, radios continued to be uncommon in Soviet aircraft, forcing continued reliance on flags and hand signals for communications with both other aircraft and ground units.

The above discussion also covers much of what was written regarding the provision of direct battlefield support. Soviet theorists recognized close air support was possible, and possibly even desirable, as in the case of the postulated anti-tank gun suppression above. However, they seem to have concentrated on assistance further from the battlefield for two reasons. One, less certain, is simply that battlefield coordination was difficult; reports on manoeuvres usually noted tactical coordination as an area needing work. More to the point, they were of the opinion that aircraft had better things to do.

> We emphasize the notion that aviation, as a rule, *extends artillery fires' depth* [of the enemy's positions – JS], *but does not replace them*....[226]

In western parlance, the term 'flying artillery' is usually derisive. The Soviets felt that 'flying artillery' was a fine description of air support: a means of delivering fire to greater depth, and potentially with greater accuracy, than was possible with artillery. Thus a 1930 article called for long-range artillery to fire out to 7.5 km from the front line,

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[223] A. Lapchinskii, 'AG v nastupatel'nom boiu korpusa', (*Voina i revoliutsiia*, No. 3, 1932, pp. 43-66), pp. 63-64.

[224] Mednis, *Taktika shturmovoi aviatsii*.

[225] A. Korotkov, 'Radio – istrebiteliu', (*Vestnik vozdushnogo flota*, No. 2, 1933, p. 46), p. 46, is an impassioned plea for radios in fighters; it was ignored. V. Soldatov, 'Vozdushnii boi shturmovikov v veroiatnikh polozheniiakh', (*Vestnik vozdushnogo flota*, No. 6, 1936, pp. 13-14), made the case for radios in aerial combat. A rebuttal, E. Kharitskii, 'Tochka zreniia na stat'iu t. Soldatov 'Vozdushnii boi shturmovikov v veroiatnikh polozheniiakh' (VVF No. 6, 1936)', (*Vestnik vozdushnogo flota*, No. 9, 1936, pp. 7-8), denied that radios were any use at all in aerial combat due to their weight and their difficulty of use, eliciting a defense of radio in Riabtsev, 'Na st. t. Soldatova 'Vozdushnii boi shturmovikov v veroiatnikh polozheniiakh' (VVF No. 6 i 9 za 1936 g.)', (*Vestnik vozdushnogo flota*, No. 2, 1937, pp. 11-13).

[226] Khripin, 'Iz opyta Bobruiskikh manevrov', p. 7. Emphasis in original.

while close attack aircraft struck targets deeper in the enemy deployment.[227] However, many writers were not very specific about the targets that actually ought to be struck, content to present a laundry list of conceivable targets. Specific proposals tended to fall into three categories: troop columns, railroads, and direct support of major mechanized breakthroughs. Interestingly, however, Soviet interest in direct battlefield support rose steadily as they gained combat experience.

The *1929 Field Regulations* were remarkably vague regarding the doctrinal use of aviation, except in pursuit, where it noted that close attack aircraft and light bombers would attack retreating enemy columns, either covered from aviation by the fighters, or with the fighters assisting by strafing.[228] The *1936 Field Regulations* went to the other extreme, presenting a fairly wide-ranging laundry list of targets ranging from battlefield support to interdiction strikes and attacks on enemy command systems for close attack aircraft, and all of the above save battlefield support for light bombers.[229] The 1937 textbook *Taktika shturmovoi aviatsii* (*Close Attack Aviation Tactics*) presented a similar list.[230] However, in all of these doctrinal publications, the least common use was direct close air support. Doctrine largely directed aviation to conduct air interdiction, barraging targets in the enemy's tactical rear or deeper: artillery positions, command and control, reserves (either concentrated or in motion), airbases, railways, and supply dumps. Modern air theory also emphasizes interdiction over close air support; though the Soviets would reverse the weighting in the Second World War.[231]

The question of bombing troops in motion was inextricably bound up with the problem of reconnaissance and reporting the data thus gained in a timely manner. As

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[227] A. Tsiemgal, 'Boevaia rabota shturmovikov s diviziei', (*Vestnik vozdushnogo flota*, No. 2, 1930, pp. 9-14), p. 13.
[228] *Polevoi ustav RKKA 1929*, p. 153.
[229] 'Principles of Command and Control (PU-36, ch. 5)', chapter 14 of: Simpkin, *Deep Battle*, p. 200-201.
[230] Mednis, *Taktika shturmovoi aviatsii*, pp. 61, 72-74.
[231] See, for example, Warden, *The Air Campaign*, chapters 6 & 7, summarized as "The weight of history, as well as logic, falls on the interdiction side." (p. 134).

noted above, the Soviet solution tended to revolve either around accepting a relatively long lag time or around moderately controversial proposals for using radio to guide in the strike aircraft. No resolution of this question had occurred by the time aircraft were sent to Spain.

Operational railroad interdiction was widely suggested, and two leading theorists suggested it as the main task of the air force in supporting the ground forces. In 1930, Aleksandr Svechin suggested strikes on enemy railroads (and possibly trucking) as the answer to the problems of preventing the 'artillery ram' under which it was expected armies would advance. He expected that a force of 500 light and heavy bombers could shut down the railroads on a given axis by destroying the stations and their associated unloading facilities.[232] Lapchinskii argued strongly in favour of bombing railroads a few years later, approaching the question from a slightly different angle. Beginning with the twin assertions that only ground forces can occupy territory and that the air force exists as a means of dropping bombs, he argued against close support because artillery could do the job better, and against strategic bombing because the results would not be commensurate with the effort. Thus the proper role of the air force lay in separate operations – operations that, while not in direct tactical support, took place in the tactical and operational context of supporting major ground operations.[233]

Because ground combat activity required movement, supply, and command, and because the air force would never be powerful enough to bomb everything, Lapchinskii argued that it was necessary to find a carefully selected set of targets in one of those three systems which would produce the most effect:[234]

> The mission of bomber aviation, in the final analysis, is to hinder the development of the ground and air actions of the enemy. Aviation conducts this

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[232] A. Svechin, 'Aviatsiia i massi', (*Vestnik vozdushnogo flota*, No. 2, 1930, pp. 3-7), pp. 3-6.
[233] Lapchinskii, *Bombardirovochnaia aviatsiia*, (Moscow: Voenizdat, 1937), pp. 7-8, 42-47.
[234] Lapchinskii, *Bombardirovochnaia aviatsiia*, pp. 47-53.

> basic mission through the destruction in separate missions of enemy movement, supply, and command, and air forces to the greatest possible depth.[235]

Because troop columns would be difficult to catch, and command assets difficult to spot, Lapchinskii was convinced that the best target was railroads, whose destruction and the consequent lack of supplies would lead to grave problems for the enemy in the operational sector.[236] Lapchinskii's suggestion lined up with the doctrinal emphasis on air interdiction shown above; but neither he, nor the various manuals and textbooks, argued for railroad interdiciton exclusively or dicussed it in detail with any frequency. Equally often alluded to, and equally infrequently discussed in any detail, was the business of supporting a major mechanized formation during a breakthrough.

Algazin wrote two works on this topic, an article he expanded into book with little in the way of new opinions. These covered the actions of aviation in support of a 'raid' – a strike against some (unspecified) target 100-150km deep in the enemy rear by a major motor-mechanized formation and lasting 3-5 days. 'Raid' may not be the best term, since it is unclear in Algazin's writing if this was truly a force that would go out and back or a force acting as the spearhead of an operational offensive. Algazin's most controversial – and utterly ignored – suggestion was that the aviation commander ought to command the raid. Most of his recommendations were rather more conventional. A group of 400 or more aircraft was to be assembled to support the raid, with at least 50 service aircraft, 80 fighters, 125 strike aircraft (a few heavy bombers and a lot of close attack aviation), and 15 transport aircraft acting to support the raid directly, while an additional mixed group of 135 fighters and bombers attacked enemy aviation. The mechanized formation would break through the front lines with the assistance of yet other aviation elements and heavy artillery support. The elements of the aviation group directed against enemy aviation would work to gain air superiority throughout the operation. As the mechanized

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[235] Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 53.
[236] Lapchinskii, *Bombardirovochnaia aviatsiia*, pp. 426-436.

exploitation began, long-range tanks and aviation would move to neutralize the enemy in front of the mechanized formation's main columns, and aviation would also attempt to isolate the area of the breakout from enemy reserves, possibly with assistance from parachute assaults.[237]

Along the way to the objective, the ground force would seize several small to moderate-sized airfields, and leave detachments to guard them. These would be used both for resupply of the mechanized formation from the transport aircraft and as forward bases for the main aviation support group. This, in turn, would ensure air support was close enough to the deep objective to provide massed fire support when the ground force attacked the objective. The aircraft would then stage back out of these airfields as the ground force returned from its objective if such a return were part of the intended operation.[238]

What is remarkable about Algazin's examination of the problem is not all of its specifics, but the manner in which it combines many of the threads of Soviet thought about air power in the era into an implied system. In his vignette, air superiority is certainly necessary, and a very important aspect of air force activity, but it is a means to an end. Heavy bombers are useful machines, but their key characteristics are their heavy bombloads, and their ability to be based far from the area of the operation, easing local basing problems. Aircraft exist to support the ground forces in a broad sense, but do so in their own special way, carrying their bombloads to targets that other arms cannot reach; thus they are a separate arm of the military, with their own organizational and command concerns. While these concepts underlie Algazin's writing, he did not state them as explicitly as they are here, and indeed a few years after 1933 (when the book version of the above thoughts on raids was published), probably would not have agreed with some

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[237] Algazin, 'Aviatsiia v reide MMS', pp. 14-27; Algazin, *Aviatsiia v reide MMS*.
[238] Algazin, 'Aviatsiia v reide MMS', pp. 27-34.

of the cardinal points due to his sudden conversion to Douhet. Before 1935, however, his underlying assumptions would not have been very controversial amongst Soviet air officers; even though there was not a complete consensus amongst Soviet theorists on airpower.

In 1935, this began to change. As signalled by Algazin's conversion, heavy bombers and independent operations suddenly became the rage amongst theorists, at least those whose work was published. Significantly, however, while the potential of heavy bombers was much ballyhooed in journal articles, the field manuals and textbooks did not follow suit. Why the surge in enthusiasm for heavy bombers occurred is not clear, but there are several probable factors. Bomber's range, speed, and payloads were increasing rapidly. In addition, a growing number of theorists, not just in the Soviet Union, were convinced that heavy aircraft, using large-calibre, fast-firing, turret-mounted weapons, had the upper hand in aerial combat, and therefore heavy bombers could get through to targets despite opposition from single-seat fighters. Air Force Chief of Staff Khripin's enthusiasm for heavy bombers helped ensure the growing numbers of heavy bombers in the Soviet inventory (though fighters were hardly being neglected). Overestimating the accuracy of high-altitude level bombing and the destructive power of bombs, a vocal group advocated that heavy bombers were the main striking power of the air force. Because they expected airbases to be easy to find, and they were convinced of the need for air superiority, it necessarily followed that the primary activity of the air force on the outbreak of war must be major strikes against enemy airfields. This enthusiasm for heavy bombers and offensive counter-air found reflection in doctrine.

In 1932, the Red Army's Chief of Staff, A. I. Yegorov,[239] wrote a study entitled "*Taktika i operatsiia Raboche-Krestianskaia Krasnaia Armiia na novom etape*" ("*Tactics*

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[239] Aleksandr Iliich Yegorov rose to regimental command during World War 1, was arrested in 1917 for criticising the Provisional Government, joined the Soviets in 1918, and served with Stalin and Voroshilov

and Operational Art of the Worker's and Peasant's Red Army at a New Stage"), which formed the core of the 1933 manual *Vremennie ukazaniia po organizatsii glubokogo boia* (*Temporary Instructions for Organising Deep Battle*). Tactically, Yegorov laid out the concept of deep battle concisely, directing that new, powerful aviation, armor, and artillery should,[240]

> …paralyze the fire of all defensive means, independent of their depth of deployment, isolate one part of the enemy from the other, disrupt communication between them, and destroy them piecemeal.[241]

Yegorov understood the need for robust signals to coordinate efforts and effects in the kind of rapidly moving battles he foresaw, and expected communications problems to be "formidable". However, Yegorov also saw the solution: "Reliable communications are required between ground and air forces, between commands on the ground and airborne aviation; obviously, here only radio can provide control." Yegorov's endorsement of radio is interesting both in light of the ongoing debate inside the Soviet Air Force about the utility of radio, and also in light of the Soviets' failure to follow through on this concept by producing the necessary radios.[242]

Operationally, Yegorov tasked the Air Force's longer-ranged units with interdiction of railroads to a depth of 400-600 kilometers, attacking enemy air and naval forces, destroying logistics bases, and providing direct support to key ground forces. As the war developed, "heavy combat aviation" such as Khripin championed, concentrated at the High Command level, would take on the deep missions including operations against enemy political and economic targets, while "light combat aviation" would be

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during the Russian Civil War. He rose to be Chief of Staff the Red Army in 1931, but his association with Stalin during the Civil War (including being with the 1st Cavalry Army, and thus being on Stalin's side of the dispute with Tukhachevskii over the failure of the 1920 invasion of Poland) was insufficient to save Yegorov in the purges. Demoted then arrested in 1937, he was shot in March 1941. (Erickson, *Soviet High Command*, 72, 847.)

[240] A. I. Yegorov, "*Tactics and Operational Art of the Worker's and Peasant's Red Army at a New Stage*", (*The Evolution of Soviet Operaitonal Art Volume 1*, pp. 315-328), pp. 315-316; Erickson, *Soviet High Command*, p. 847.

[241] Yegorov, "*Tactics and Operational Art*", p. 318.

[242] Yegorov, "*Tactics and Operational Art*", p. 318-320, quote p. 320.

subordinated to the armies and Fronts to support the ground forces. This formulation describes a campaign for air and naval superiority, combined with an air interdiction campaign against enemy logistics and transportation, while continuing to support the mechanized spearheads with close air support. The Soviets were beginning to construct the heavy bomber aviation units, held by the High Command, and working on designs for dedicated close air support aircraft as well. Yegorov shared the theorist's interest in supporting the ground war, but took more interest than many in the opportunity to strike enemy strategic targets. His focus on railroad interdiction mirrors that of a number of theorists, including Lapchinskii. Yegorov retained the Soviet tenets that air power must be used in mass, on the decisive axis, and in support of the objectives of ground operations.[243]

In 1936, the Soviets published *PU-36* (*Polevoi Ustav RKKA 1936*, *1936 RKKA Field Regulations*), a new capstone manual replacing *PU-29.* Edited and in part directly by Deputy Director of Military Operations G. S. Isserson , under Tukhachevskii's direct supervision, *PU-36* proved to be the peak of Soviet codification of theory into doctrine in the 1930s. While written by some of their finest minds, *PU-36*'s status rests not on its perfection, but on the fact that it appeared a year before the purges swept most of those minds away and prevented further development. According to *PU-36*,[244]

> Air formations, as well as carrying out independent operations, act in close conjunction with all-arms formations at operational and tactical levels. They undertake missions against enemy columns, troop concentrations and support elements (ground-attack aircraft and light bombers); bridges (bombers); and enemy aircraft and airfields (fighters, ground-attack aircraft, light bombers). They also cover friendly forces and dispositions.[245]

Air power, *PU-36* directed, should be used beyond the range of other arms, "in mass, concentrated in time and space, and against targets of the highest tactical

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[243] Yegorov, "*Tactics and Operational Art*", p. 320-327.
[244] Simpkin, *Deep Battle*, p.44.
[245] Simpkin, *Deep Battle*, p. 180.

importance". Thus, PU-36 carried forward the Soviet tenet of massed employment on the decisive axis, and sought to do so through air interdiction against enemy movements and transportation, offensive counter-air. The word "also" implies that providing defensive counter-air was secondary to these other tasks.[246]

While *PU-36* stressed the importance of signals to ensure coordination between air and ground forces, it did not stress the importance of using radio for the purpose, unlike the *Temporary Instructions for Organizing Deep Battle*. However, it did require ground force commanders to find and prepare airstrips as their forces advanced, a concept to which the Soviets would return in 1944 in order to ensure their rapidly advancing forces would not outstrip their air cover. Being focused on the ground forces, *PU-36* did not comment on the Air Force's separate actions, though the emphasis on air interdiction of transportation implies that Soviet doctrine had not changed from the *Temporary Instructions for Organizing Deep Battle*.[247]

Perhaps the Soviets would have moved towards an air force based around heavy bombers in the later 1930s if their thinking had proceeded without interruption. However, in 1936-1937, two events occurred which put the heavy bomber movement to rest. First, in 1936, the Spanish Civil War broke out. Stalin sent Soviet forces, including significant numbers of aircraft, to assist the Republicans. Reports from the front did not support the heavy bomber supremacy fad. Second, in 1937, Stalin initiated the major purge of the military. Most of the theorists mentioned up to this point were arrested and shot; the major exception appears to have been Lapchinskii, who may have died a natural death in May 1938.[248] The combination of new blood and hard evidence changed the path of the Soviet Air Force.

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[246] Simpkin, *Deep Battle*, p. 199-200.
[247] Simpkin, *Deep Battle*, p. 199-202.
[248] Reina Pennington, 'From Chaos to the Eve of the Great Patriotic War, 1922-1941', (Robin Higham, John Greenwood, and Von Hardesty, *Russian Aviation and Air Power in the Twentieth Century*, (London:

Frank Cass, 1998), pp. 37-61), pp. 46-47, 50-51, suggests Lapchinskii died a natural death in 1938. M. Irtiuga, 'Kombrig A. N. Lapchinskii', (*Voenno-Istoricheskii Zhurnal*, No. 7, 1972, pp. 122-125), states (p. 125) Lapchinskii died on May 2, 1938, without suggesting in any way that he was arrested. Lapchinskii's final book, *Vozdushnaia armiia*, was published posthumously in 1939 and signed for printing after his death. On the other hand, *Vestnik vozdushnogo flota* failed to run an obituary for him, as might be expected for a major, undisgraced, figure.

Chapter 3
Small Wars, 1936-1940

In the years 1936 through 1940, the Soviets involved themselves in a succession of small wars in Spain, Mongolia, China, and Finland. These small wars provided both a laboratory, in which the Soviets could look for validation of their theories, and a testing-ground in which the ability of the VVS to put these theories into practice was tested. Some theories quickly fell by the wayside, such as the fantasies concerning a bomber's ability to ward off fighter attacks with ease. Other theories continued to be hotly debated, such as the effectiveness of airbase strikes, even after the Luftwaffe's firepower demonstrations in Poland (1939) and France (1940).

These wars demonstrated increasingly glaring weaknesses in the Soviet Air Force's ability to convert theory and lessons learned into practice. While it put in a good showing over Spain, using carefully picked pilots, and did reasonably well in China, initial combats in Mongolia showed poor results only rectified by a crash program in which veterans from other wars were brought in. Finland, the largest of these wars, was also the worst showing for the Air Force. Committed in numbers that prevented it from calling in other units to cover for deficiencies, initial problems were crippling, and only partially solved by the end of the war.

The poor showing in Finland reflected a doctrinal problem in the Air Force. While there was a broad consensus that the overarching mission of the Air Force was to support the ground forces, there was far less agreement on what missions this translated into, and what the priorities between these missions might be. Furthermore, the Air Force had grave difficulty training new officers for a variety of reasons, one of which being the lack of consensus on methods.

Spain

On 18 July 1936, elements of the Spanish armed forces began what they hoped would be a rapid coup d'etat against the Spanish government. They failed to achieve complete success, thus plunging the country into nearly three years of war. While the politics preceding and during the war are quite complex and beyond the scope of this work, the insurgents, generally backed by conservatives and the Spanish Phalange, are generally known as the 'Nationalists', while the Spanish Government, largely backed by left-wing and centrist groups, is usually labelled the 'Republicans'.

One of the keys to victory in the war turned out to be foreign aid: in general, the Nationalists were free to trade and procure arms while the Republic was not. Before beginning their coup, the Nationalists had lined up support from Italy and also expected support from Germany. This assistance soon proved of great importance. The coup left the most battleworthy formation of the Spanish Army - the Army of Africa, commanded by General Francisco Franco - in Morocco. The insurgents needed it for operations in Spain, but the Republican Navy controlled the Straits of Gibraltar. Aircraft provided by Italy and Germany were instrumental in speeding up the transport of the Army of Africa to Spain, both through the first large-scale airlift in history and by bombing the Republican Navy. The latter effort, plus the arrival of two German warships, permitted the escort of the remainder of the Army of Africa on surface transports. Italian and German support to the Nationalists remained significant and unimpeded throughout the war.

The Republic swiftly turned to France for assistance. The French government was favourable, but needed to keep in the good graces of Britain, which was deeply divided over the Spanish conflict. The resultant political manoeuvring between France, Britain,

Germany, and Italy resulted in the checkmate of any Spanish Republican hopes for Western assistance while leaving the Germans and Italians free to assist the Nationalists as they desired.

This presented Stalin with a dilemma. The Spanish Republic had a Popular Front government, friendly to the Soviets, and he did not wish to leave it in the lurch. On the other hand, the Soviets were worried by resurgent militarism in Germany, and to counterbalance Germany, Stalin wished to remain on good terms with France and Britain. As a result, the Soviets went along with the various diplomatic 'Non-Intervention' measures taken in the first few months of the war. As it became obvious that these were a sham, the Soviets began to sell large amounts of military equipment to the Republic, including their latest tanks and aircraft, and shipped them there along with numerous military advisors and crews. This supply of arms and advisors slumped in 1937 as the blockade of Republican ports by the Nationalist and Italian Navies made it increasingly impractical to continue. By October 1938, the Soviet advisors had departed and the Spanish Republic was on its own.[249]

The Spanish Civil War is often treated as a dress rehearsal for World War II, and in some respects this is true. It did involve clashes of tanks and aircraft, and the ideological battle-lines were similar. However, as suggested by James Corum, it is better viewed as the first major modern limited war. However total a war it was for the Spaniards, the outcome was determined by the levels of foreign assistance provided, and that assistance was never provided free of charge, without restrictions or strings. All of the major intervening powers had interests outside of Spain, which helped to dictate their

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[249] The discussion of the politics of the Spanish Civil War is based on: Jackson, Gabriel, *The Spanish Republic and the Civil War, 1931-1939*, (Princeton: Princeton University Press, 1972), Thomas, Hugh, *The Spanish Civil War*, (London: Penguin, 1986), Preston, Paul, *A Concise History of the Spanish Civil War*. (London: Fontana Press, 1996).

policy towards, and inside of, Spain.[250] Thus the Germans held the Condor Legion to 100 aircraft, the Italians persistently tried to take the glory for various conquests, and the Soviets tried to drive the Republic into becoming a Soviet satellite - the latter two policies leading not only to friction amongst the respective allies, but also to disaster for the reputation of Italian arms, and the disintegration of Republican internal stability which hastened its demise.

Turning more specifically to the air war, a few brief aircraft introductions are in order. While both sides used a mix of aircraft, several are of import to this study. Unsurprisingly, the Italians, Germans, and Soviets provided these aircraft. The Italian Fiat 51 C.R. 32 and the German Heinkel 51 were reasonably good fighters in the early stages of the war but were outclassed by the Soviet I-15 and I-16 fighters which began to arrive in October 1936. The I-16 was in turn outclassed by the Me-109, which began to arrive in July 1937 to restore the honour of the Condor Legion. The Soviets also provided the SB-2 medium bomber, faster than most fighters of the day (the Me-109 being the important exception), while the German Ju-52 was extensively used as both a transport and a bomber. In addition, the Condor Legion tested the Ju-87 Stuka, Do-17, and He-111 in Spain.

Two specific incidents from the war in Spain deserve mention because of their dramatic impact. The first of these occurred in late 1936, virtually as soon as Soviet fighters entered combat. Until this time, those Soviet theorists (such as Ionov) who had been arguing that fighters were powerless before bomber defences had seemed to be ascendant. Then Soviet-built (and partly Soviet-flown) fighters appeared over Madrid in November 1936 and promptly caused much trouble to the Nationalist aircraft, primarily

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[250] Corum, James S., 'The Luftwaffe and the Coalition Air War in Spain, 1936-1939', *The Journal of Strategic Studies*, 1, 1995.

Ju-52s, which were attempting to bomb the city. On 29 December 1936, *Pravda* noted that,

> Thanks to the experience of combat over Madrid, the opinion that the greater flight speed of bombers and the great power of their armament made them untouchable by fighters has been completely broken.[251]

Debate would continue over the relative power of fighters to bombers. A few, notably Ionov, would continue to argue that fighters were not especially useful; but theirs was no longer a majority opinion. It is not too dramatic to state that on 5 November 1936, when I-16s and I-15s first turned back a Nationalist bombing raid, they won the interceptor a place in Soviet air theory and doctrine. With 'our fighters' clearly beating 'their bombers' - regardless of the mismatch in capabilities – it was both patriotically and politically difficult to continue to argue the case for the impotence of fighters.

Six months later fighters won a wider role at Guadalajara, a famous and somewhat misunderstood battle. The popular notion of Guadalajara boils down to an Italian Corps being destroyed by airpower alone. This overstates the case and distorts the more ambiguous and complex reality. Airpower did indeed play an important role in the battle, but it did so under peculiar conditions and other arms were also vital.

The battle was initially conceived as a means of taking Madrid. Previous efforts, directed closer to the city, had failed. The Nationalist command thought that a strike down the axis of the good road from Siguenza towards Madrid would meet with success, especially since the initial assault would take the highest ground and the attack would roll downhill from there. 50,000 troops were assembled (of which 30,000 were Italian), along with 250 tanks, 180 guns, and around 20 trucks for every 650 soldiers. A large, well-equipped force, it was expected to roll over the Republican defence, take Madrid, and win the war.

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[251] B. Ageev, 'Protivovozdushnaia oborona Madrida', *Pravda*, 29 Dec 1936 (No. 318), quoted in I. Kovalev, 'Rol' i zadachi sovremennoi istrebitel'noi aviatsii', (*Voennaia Mysl'* No. 5-6, 1937, pp. 100-135), p. 102.

The offensive did not go quite according to plan. It jumped off on 8 March 1937 and initially went well; the heights were taken and the Republican defence appeared to be broken. The Italians insisted on taking the lead and began driving their corps down the road. On 11 March, a combination of events overtook them. First, the Republican defence in front of them solidified. Second, the on the 10th the weather had changed to a mix of heavy rain, snow, and sleet, while low clouds blanketed the area. This turned the roadsides to mud, preventing vehicles from leaving the road. It also prevented Nationalist aircraft from flying. However, Republican aircraft were able to fly from the 11th onwards, though at some hazard due to the low cloud ceiling.

As a result, Republican aviation was able to attack a stationary target exposed in column on a single road, utterly devoid of air cover. The column's anti-aircraft defences were soon broken, and only the weather provided any real deterrent to the 114 aircraft (84 fighters, 20 fast bombers, plus 10 recon aircraft pressed into a strike role), which proceeded to bomb and strafe the column while Republican forces went onto the offensive. While unarmoured close support aircraft took heavy losses, the air support materially assisted in shattering the Italian column and allowing Republican forces to repel the Italian offensive.[252]

These dramatic events demonstrated that, under nearly optimal conditions, the impact of airpower could be immense. This was further demonstrated in the Nationalist campaign against Bilbao, where they enjoyed complete air superiority and utilised it to good effect, as the Soviets were well aware - though their attention focused on the actions of their own forces.[253] Close air support had confirmed its place and would be tried again in the future. The Soviets learned a number of lessons. The importance of close co-

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[252] S. Liubarskii, 'Nekotorie vivodi iz opita voini v Ispanii. Nastuplenie.', (*Voennaia mysl'*, 10, 1938, pp. 12-31), pp. 24-26; V. Chernetskii, 'V nebe Ispanii', (*Voenno-istoricheskii zhurnal*, 8, 1976), pp. 89-92; P. I. Samoilov, *Gvadalakhara: Razgrom Italianskogo ekspeditsionnogo korpusa*, (Moscow: Voenizdat, 1940).
[253] S. Liubarskii, 'Nekotorie vivodi iz opita voini v Ispanii. Nastuplenie.', (*Voennaia mysl'*, #10, 1938, pp. 12-31), pp. 25-26; *Voina v Ispanii, #3, Boevie deistviia aviatsii*, (Moscow: Gosvoenizdat, 1937), p. 10.

operation between air and ground forces had been made clear, though the means of achieving it less so. Suggested solutions usually revolved around better staff work, the attachment of an air staff officer to the ground staff, and better use of pyrotechnic signals. Radio, for reasons that will be discussed later, did not prove itself on the Republican side in Spain and was not thought workable. As a result, what would prove the best and most flexible means of controlling close air support remained largely unexamined.[254] Equally, the Soviets noted the need for repeated strikes, either by sending a stream of small strikes to the battlefield (as the Nationalists did) or by using several concentrated strikes (as the Republicans did).[255]

The question of attaining air superiority remained fresh, with theories pitted against the realities observed in Spain. Prior to the war in Spain, there had been a growing consensus that the best means of attaining air superiority lay through bombing enemy airbases. This was predicated, in part, on the assumption that the fighter was increasingly powerless against the bomber. The Spanish War soon showed the latter to be groundless, but both sides in the war made attempts to bomb each other's airbases, with some initial claimed success. Nonetheless, as a 1937 report noted, bombing airbases was soon discovered to be 'a much more difficult matter than had been anticipated in peacetime'.[256] Frequent basing changes, good camouflage, and false airbases made it difficult to discover enemy airbases in the first place, or then to arrive with sufficient surprise to catch enemy aircraft on the ground, let alone bomb them with enough accuracy to do any damage. Nonetheless, Soviet analysts believed that with improved co-ordination between reconnaissance units and strike units, the use of low-altitude approaches, and repeated systematic strikes, bombing airbases could be an important

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[254] B. Teplinskii, 'Osnovi vzaimodeistviia mezhdu aviatsionnimi i obshchevoiskovimi shtabami', (*Vestnik vozdushnogo flota*, No. 2, 1939, pp. 31-36), pp. 31-34.
[255] P. I. Samoilov, *Guadalakhara*, pp. 141-142.
[256] *Voina v Ispanii, #3, Boevie deistviia aviatsii*, p. 13.

technique against enemy airpower. This attitude remained despite its near-complete lack of success in Spain once both sides had dispersed and camouflaged their bases after the initial months of the war.[257]

However, one question mark remained above Soviet experience from the war: was Spain actually representative? The Soviets were not sure, because the numbers of aircraft involved were small. S. Liubarskii's[258] estimate, that the Spanish War only employed 5-8% of the aircraft that could be expected in a major European war, was typical. However, the Soviets learned that they needed new aircraft. The SB and I-16 began to enter service in 1935-1936 and were among the best in the world when they entered combat in Spain in 1936. Nonetheless, when the Me-109 entered combat in 1938, it outclassed them. The Soviets ramped up their development programs in early 1939. As a result, a newer generation of aircraft began to enter service in 1941. Ironically, in this manner the Luftwaffe's victories in Spain ultimately played a role in strengthening the Soviet's ability to fight back in World War 2.[259]

China

Japan attacked China in July 1937, rapidly developing a full-scale invasion. Stalin could hardly ignore this development, especially since it might tie down Japan in an extended war in China and thus weaken the threat of of a two-front war posed by the German-Japanese Anti-Comintern Pact. The Soviets sent extensive assistance to the Nationalist Chinese; various Soviet sources claim this amounted to at least 600 aircraft (a mix of, at least, I-15 and I-16 fighters, SB bombers, with TB-3 bombers used for transport

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[257] *Voina v Ispanii, #3, Boevie deistviia aviatsii*, p. 11-14; *Voina v Ispanii: boevie deistviia aviatsii (s nachala miatezha)*, pp. 25-26; Migulin, *Teoriia i praktika*, p. 63; RKKA, *Voina v Ispanii: boevie deistviia aviatsii (s nachala miatezha)*, pp. 25-26.

[258] Stepan Ivanovich Liubarskii was Deputy Chief of the Combat Training Directorate's First Section in 1940. During the Second World War, he served as Chief of Staff to several Armies and the 2nd Belorussian Front before being killed in action in 1945. (Generals.dk: http://www.generals.dk/nation/Soviet_Union.html)

[259] S. Liubarskii, 'Nekotorie vivodi', pp. 31; P. Avdeekno, 'Sovetskoe samletostroenie v gody predvoennikh piatiletok (1929 – 1940 gg.), (*Voenno-Istoriicheskii Zhurnal*, 7, 1974, pp. 84-89), pp. 86-89.

from the USSR on at least some occasions), 100 guns, equipment for 24 divisions including 8,300 machine guns, $450 million (USD) in loans, and 3,665 military advisors, including pilots.[260] At least two of the advisors were air force specialists, and the Air Force was subordinated to the Military Advisor, Chinese Army, via an air committee.[261]

The scale of the forces sent to China is striking. Equally striking is the dearth of information on the activity of those forces. Several factors probably account for this. In works written after 1949, the Soviets probably considered it embarrassing that their support had not gone to the Chinese Communists, and levels of information in post-war works correlate well with the political climate towards China at their time of printing. Before 1941, a European bias might come from considering Germany the greatest potential threat. The war in Spain, where the numbers of aircraft were roughly equal, may have seemed a better laboratory for future war than China, where the Japanese Air Force generally outnumbered the Chinese. Regardless, the quantity of articles published about the war in China was dwarfed by those written about the war in Spain; and often authors would write that 'experience in Spain and China shows' – but then use examples exclusively from Spain.

Nonetheless, some did discuss Chinese lessons. Close air support, by fighters as well as bombers, was seen to be of great value. The Soviets saw the Japanese using it to make up for weaknesses in their artillery and preceding every major offensive with massive airstrikes in concert with a steady stream of smaller strikes. Experience in the engagement at Lake Khasan, where the Soviets used heavy air support without Japanese aerial opposition, also confirmed this. The main problem, as in Spain, was co-operation

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[260] A. I. Cherepanov, 'Itogi Ukhan'skoi operatsii', (Iu. V. Chudodeev, *Na Kitaiskoi zemle*, Moscow: Vostochnoi literaturi, 1974, pp. 134-181), p. 137; M. F. Iur'ev, et al., *Kitai v period voini protiv Iaponskoi agressii (1937-1945)*, (Moscow: Vostochnoi literaturi, 1988), p. 17; A. S. Perevertailo, *Ocherki istorii Kitaiia v noveishee vremiia*, (Moscow: Vostochnoi literaturi, 1959), p. 310; A. I. Cherepanov, *Zapiski voennogo sovetnika v Kitae*, (Moscow: Vostochnoi literaturi, 1976), pp. 603-612; Jonathan Spence, *The Search for Modern China*, (New York, W. W. Norton & Co., 1990), p. 450; A. I. Kokoshin, *Armiia i politika*, p. 110.

[261] A. I. Cherepanov, *Zapiski voennogo sovetnika*, pp. 607-612.

between the ground forces and the aircraft. Japanese air-ground co-operation appeared to be fairly good, and it is implied that Chinese co-operation was fairly poor.[262]

Lessons on counter-air operations mostly related to force protection. Chinese strikes on Japanese airbases seem to have been rare. While claims of success with occasional surprise raids on Japanese airbases are probably broadly correct, other claims of successfully bombing Japanese airbases from high altitudes – over 7,000 meters – are probably not.[263] In any event, more of the discussion concerned means of avoiding the Japanese strikes on Chinese bases. These were tied up with the changes in how the Chinese fought the air war.

In 1937, the Chinese tried to oppose the Japanese Air Force directly, defending their airbases from attack and taking part in ground battles. However, the close air support achieved little in the face of Japanese numerical superiority. Moreover, the Japanese conducted a relentless bombing campaign against Chinese airbases within 100km of the front, intense enough that even frequent shifting of bases and the use of numerous deception airbases proved ineffective countermeasures. In the end, this forward-basing strategy threatened the Chinese Air Force with extinction despite inflows of Soviet aircraft.[264]

Therefore, in December 1937, the Chinese adopted a new strategy. The Air Force was pulled into the deep rear, at several large airbases 450-700km from the front. At these bases, anti-aircraft guns and fighters could be concentrated for defence. Missions to the front would stage from a rear base to a forward base, where the aircraft would be armed and refuelled, then conduct their missions. While wearing on the aircrew, this kept

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[262] A. Alimov, 'Operativnoe ispol'zovanie VVS na Voina v Kitae', (*Vestnik vozdushnogo flota* , #7, 1938, pp. 18-24), pp. 19, 22, 24; Teplinskii, 'Boevaia aviatsiia vo vzaimodeistvii s nazemnimi voiskami', (*Vestnik vozdushnogo flota*, 8, 1938, pp. 26-32), pp. 27, 30; B. Teplinskii, 'Aviatsiia na pole boia', (*Vestnik vozdushnogo flota*, 11, 1938, pp. 31-39), pp. 31, 36-37; A. I. Bogdanov, 'Shturmovaia aviatsiia v obshchevoiskovom nastupatel'nom boiu', (*Vestnik vozdushnogo flota*, 7, 1939, pp. 7-25), p. 10; N. Zamiatin, 'Nekotorie vivodi iz voini v Kitae', (*Voennaia Mysl'*, #5, 1939, pp. 59-77), p. 70-72.

[263] A. Alimov, 'Operativnoe ispol'zovanie VVS', pp. 19, 21.

[264] A. Alimov, 'Operativnoe ispol'zovanie VVS', pp. 18-19.

the main bases mostly beyond Japanese range. Also, when aircraft were caught at the forward bases, they could more easily fly away to the relative safety of the bases in the rear. Japanese raids on the rearward bases had to use larger formations and occurred only 1-3 times per month instead of daily. The large rear bases also eased the centralization of command and the concentration of units for strikes. Moreover, the greater depth provided longer warning times of Japanese strikes on the bases and thus eased base defence.[265]

Experience in China was also seen to confirm earlier theories about the actions of a small air force against a larger. As predicted by Tukhachevskii in 1920, an inferior air force could use evasion into depth and concentration on important missions and axes for local superiority in order to provide effective support and maintain its continued ability to resist. Chinese resistance was effective despite the change of tactics for 1938; the Japanese Air Force took significant losses in the battle for Wuhan, Xuzhou, and Kaifeng, hindering the advance of the Japanese Army.[266]

Thus, practical experience in Spain and China provided several lessons. Fighters won their place by demonstrating that they could inflict serious losses on bombers. Close air support was widely used, and though some still debated whether this was a good idea, a steady stream of examples of the effectiveness of such support, combined with the Soviet proclivity for the idea of supporting the ground forces, left the issue in little doubt. The star of heavy bombers as the agents of an independent air war, rising before the Spanish war, waned in the face of effective fighter resistance, ineffective city bombing, and the questionable politics of city-busting. Raids on airbases were found effective when the target did not take appropriate countermeasures of camouflage, dispersal, and defence – but thought relatively powerless when the target took these measures, Japanese successes in China notwithstanding. Experience in China validated the overall thinking

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[265] A. Alimov, 'Operativnoe ispol'zovanie VVS', pp. 20-21.
[266] A. Alimov, 'Operativnoe ispol'zovanie VVS', pp. 21-22; Spence, *Search for Modern China*, p. 450; Tukhachevskii, 'Taktika aviatsii', pp. 93-94.

from the 1920s on the actions of small air forces in the face of a superior foe, such as the use of deep airbases and concentration on single operational missions to achieve aerial parity or superiority for a short period of time. Finally, many Soviet aircrew gained combat experience against the Japanese and the Germans, then seen as the most threatening foreign nations and, in fact, nations against which the Soviets would shortly be at war.

Thus it would seem that in early 1939 the Soviet Air Force should have been in a good position to handle the challenges to come. Much ink had been spilled on the experiences and lessons of the war in Spain and a trickle on China. The Soviet aircraft inventory included reasonably good aircraft and newer aircraft were on the design boards and testing fields to outclass the German aircraft met in Spain. The small war about to take place against Japan at Khalkin-Gol, however, unmasked serious problems that went largely uncorrected until 1942 despite later experience in Finland and observed actions in the West.

Perhaps the most significant missed opportunity in Soviet aviation was radio. With hindsight, radio is the obvious solution to many problems of command, control, and co-ordination. Indeed, some Soviets were great fans of radio, noting in 1938 the 'enormous superiority' that radio communications granted. Moreover, the Soviets were aware of the developments in tactics that radio made possible, and appear to have made some attempt to emulate them in Spain.[267] Yet what seems obvious in hindsight was less obvious at the time. Radio in the 1930s was in a state comparable, perhaps, to the efforts to digitise the battlefield at the turn of the 21st century: a potentially powerful tool, but a new and not necessarily reliable one. Aircraft in Spain were initially equipped with radios, but the radios were heavy and slowed the aircraft down, thus reducing their

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[267] Starikh, 'Radio kak sredstvo upravleniia istrebitel'iami', (*Vestnik vozdushnogo flota*, 10, 1938, pp. 26-30), pp. 26-30; Migulin, *Teoriia i praktika*, p. 76-79.

survivability in combat. Moreover, external antennae either broke or slowed the aircraft, while internal antennae had to be supported by hand in order to function – a difficult task when flying in combat. Because of these difficulties, the Soviet Intelligence Directorate reported in 1937 that, 'The fighter aviation of the Republican Army, in conducting its combat sorties, never once used its radios in the air, as a result of which they were removed.'[268] Some theorists liked radios; but in practice they were not yet light and reliable enough for their usefulness to be entirely clear. In this, the Soviets were not alone. Japanese pilots cut radio masts from their aircraft well into the Second World War, while a Luftwaffe signals officer's memoir fumes over the contempt Luftwaffe veterans of the Spanish War held for radios in particular and signals in general, quoting Adolf Galland as saying, '… it would be best to throw out all of these damned radios! We don't need them. We didn't need them in Spain and without them we could fly higher and faster!'[269]

Khalkin Gol

In May 1939, Japanese and Mongolian units clashed along the disputed border between Manchukuo (Japanese Manchuria) and Mongolia, which was a Soviet client state. Events rapidly escalated. The reinforced Japanese 23rd Division conducted a series of offensives in June and July that nearly carried it across the Khalkin-Gol ('Halha River'). Both sides reinforced over the summer with a view towards an offensive. Soviet commander Georgii Zhukov struck first, in late August, nearly obliterating the opposing Japanese forces in a mechanized encirclement battle.

From the Air Force's point of view, this undeclared war was important because, for the first time since 1921, the Soviet Air Force met an enemy in the air while inside its

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[268] RKKA, *Voina v Ispanii: boevie deistviia aviatsii (s nachala miatezha)*, pp. 109-110.
[269] Sakai Saburo, 'Zero Ace', pp. 135-145 in Haruka Cook & Theodore Cook, *Japan at War: An Oral History*, (New York: The New Press, 1992), p. 136; Ulrich Steinhilper, *Spitfire on My Tail*, (Trowbridge: Redwood Books, 1990), see especially pp. 126-128, 180-181 for Adolf Galland's dismissal of radio, quote on p. 180.

own military structure (as opposed to the combat it engaged in with pilots seconded to, and aircraft sold to, another Air Force, as in Spain and China.) While the Soviet performance was reasonably sound after a shaky start, the fact of the shaky beginning showed an important weakness in the Soviet Air Force's process for turning war experience into doctrine and training.

In the initial aerial fighting, in May, the Soviets suffered heavy losses, losing, by their own account, 15 Soviet aircraft for every Japanese aircraft shot down. After a disastrous attempt to attack a Japanese airbase on 27 May, in which thirteen I-15 fighters sortied, but only one returned, the Soviets stopped flying for nearly a month in order to try to sort out their problems. They knew how they ought to gain air superiority, but incapable of accomplishing the mission.[270]

Two days later, on 29 May, a group of 48 pilots and engineers flew in, summoned by Zhukov. Most had combat experience in Spain and China, and Iakov Smushkevich, then the Representative of the Chief of the Air Force Directorate, headed the group. Debriefing and analysis revealed numerous Soviet tactical flaws. These included a near-complete lack of co-operation between aircraft, a consistent failure to try to get altitude or positional advantages before entering combat, misuse or misunderstanding of the strengths of the I-16 and I-15 fighters relative to the Japanese I-97 (the I-15 was better at angles fighting, the I-16 better at the energy battle), a dearth of experienced pilots, and Japanese use of radio communications. Three weeks of intensive training followed before the Soviets took to the air again.[271]

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[270] M. V. Novikov, *Boevie deistviia na Khalkhin-Gole v 1939 godu i ikh znachenie dlia razvitiia Sovetskogo voennogo iskusstva*, (Dissertation: Institute of Military History of the Ministry of Defence of the USSR, Moscow, 1974), pp. 56-58. Alvin D. Coox, *Nomonhan: Japan Against Russia, 1939*, (Stanford: Stanford University Press, 1990), p. 241-242. Coox confirms the single Japanese loss as of 20 May 1939, but in most respects the two accounts (Novikov's based on Soviet sources, and Coox's based on Japanese) are very difficult to correlate beyond the general course of the air war.

[271] Novikov, *Boevie deistviia na Khalkhin-Gole*, pp. 58-60.

The Soviets next entered combat on 22 June. The training showed; both Japanese and Soviets agree the Soviet performance was much improved. The Japanese, in order to try to retain superiority, struck at the Soviet airbases on 27 June, destroying at least 16 aircraft. Smushkevich's team identified and corrected weaknesses in the early warning systems, tightened up air base defence, and instituted dispersal and camouflage of the aircraft and bases. (The Chinese lesson of deep basing was not utilised because the Soviets aimed for air superiority at Khalkin-Gol, not force preservation.) The Soviets claim not to have been caught napping after this.[272]

Striking back, the Soviets raided the Japanese bases on 3 and 4 July, and lost 9 of 150 aircraft, mostly to ground fire. Again, Smushkevich and his team analysed the combat, concluding that fighter-bomber co-operation had been poor and that the bombers had conducted no evasive manoeuvres to evade anti-aircraft fire. A repeat raid on 5 July took no losses.[273] Put together, these steady improvements resulted in Soviet air superiority by the end of July.[274]

Despite hard fighting in the air on both sides, the Soviets maintained enough of an edge to blunt the Japanese attacks in July, and to maintain the security and secrecy of their own deployments for Zhukov's shattering attack in August. Communications and air raid warning systems steadily improved. The Soviets also began an extensive airbase construction program, raising their numbers from 2 in May to 63 by the end of July – making possible dispersion that rendered Japanese strikes on Soviet bases fruitless. Air units attached members of their command staff to the staffs of supported ground units to improve ground support, and all aircrew worked on improving co-ordination in the air.[275]

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[272] Novikov, *Boevie deistviia na Khalkhin-Gole*, pp. 59-61, 66.
[273] Novikov, *Boevie deistviia na Khalkhin-Gole*, pp. 61-62, 67.
[274] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 69; Coox, *Nomonhan*, pp. 490, 512.
[275] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 115-130.

All told, the Soviets engaged on a crash course in making their doctrine actually work, and this crash course was partly successful. While theory and doctrine called for offensive counter-air as the primary means of gaining air superiority, doctrine did not specically designate a preferred method, and the Soviets made greater use of defensive couter-air measures at Khalkin-Gol, launching only three strikes against Japanese airbases in the later summer. Theory and doctrine called for air interdiction, but the Soviets appear to have ignored it in favor of close air support. They relied more on defensive counter-air measures than offensive, as shown by the three strikes launched against Japanese bases in the later summer.

Analyzing their experience at Khalkin-Gol, the Soviets noted the importance of radios for organized group combat by fighters, resulting in an official requirement for a light, reliable radio for all fighters. The Soviets also learned, as in Spain, that speed was a prime requirement for fighters. Combat proved biplanes to be ineffective, despite having a tighter turning radius, so the Soviets slowed their production, beginning the process of phasing them out of service. Conversely, the Soviets accelerated aircraft development programs begun on the basis of Spanish experience. The Soviets also noted that fighters needed to be based close to the areas they were to protect and needed to be supported by strong command, control, and warning systems.[276]

Analysts also drew a number of incorrect conclusions from Khalkin-Gol. Machine-gun armed fighters got more kills due to their lighter weight and the very light armour on Japanese aircraft, as a result of which the Soviets under-rated cannon armament. They failed to note the SB bomber's faults: a small bombload, easily ignited fuel tanks, and weak to non-existent defences. They did not address flaws in the conduct of group battle, navigation, and aerial combat that had appeared. Combined, these failures to learn tactical lessons cost the Soviets dearly in Finland and 1941, limiting their

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[276] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 159-160, 177-178.

ability to accomplish missions successfully. Perhaps most importantly, G. P. Kravchenko,[277] commander of the 22nd Fighter Regiment at Khalkin-Gol, came away convinced that strikes on enemy airbases were ineffective as a means of gaining air superiority. We shall meet Kravchenko again, in December 1940, when, as commander of the Baltic Military District Air Force, he still held this opinion.[278]

One particularly important lesson seems to have been missed: it is strange that any of these lessons needed to be learned at all. The same lessons had been learned in Spain and, to a lesser degree, in China. They had been written up, published, and distributed to Air Force units. But the use of experience is a two-way street. Not only must experience be gathered and analyzed; it must also be disseminated and understood. The effectiveness of Smushkevich's group in turning around the air war at Khalkin-Gol is noteworthy, and in a direct sense, he certainly earned his second Hero of the Soviet Union, awarded for his activity at Khalkin-Gol. Yet in another sense the award was undeserved. Why were the two aviation regiments in Mongolia in May 1939 so unprepared for combat?[279]

It is possible that the regiments were in a backwater location, poorly supplied and poorly trained. Indeed, the pilots were green, and half of the 70th Fighter Regiment's aircraft were out of service for repairs in May 1939. Yet those units were rapidly reinforced with other units in better shape, and the situation did not change.[280] In the aftermath of the Finnish War, the reason for these troubles came out in the Central Committee's review of the Finnish War on 14 - 17 April 1940. The discussion moved to

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[277] Grigorii Panteleevich Kravchenko became a pilot in 1932, served in China and Mongolia in 1938-1940, and rose to command the Baltic Military District Air Force in April 1940. He commanded various formations in the Second World War before being killed in air combat on 23 February 1943. (Zolotarev, V. A., et al., *Materiali soveshchaniia 23-31 dekabria 1940 g.*, p. 192.)

[278] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 155-158, 162, 177-178.

[279] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 56, 126.

[280] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 56.

the problem of officers not reading the analyses provided by the intelligence bureau, and eventually moved to the heart of the matter:[281]

> PROSKUROV: [...] Facts related to the study of intelligence materials:
> 1. People at the administration of the air force do not read literature produced by the 5th Office, including strictly aviation material. For instance, the German experience of the use of aircraft in the Polish campaign, the field manual of the French air force, the German air force field manual, etc. The air force chief of staff did not even see all the literature available; it is kept by some minor official and not reported. Department chiefs, people who should keep abreast of all foreign innovations, do not, as a rule, read this material either.
> 2. Take the Artillery Administration; department chiefs here do not read intelligence reports on foreign techniques. These reports, having been made known to the chiefs of information departments in the Administration, are sent to the secret library. These books stay in the secret library without any movement. Books like: *The German Army Artillery*, or *The French Army*, have been read by only four persons.
>
> MERETSKOV: These books are classified, I cannot take a book home, and I cannot read it at work, I've work to do, therefore, these books lie untouched, unread. I may not take a book home, because it is considered sensitive information. A regimental commander will never borrow this book.[282]

None of the participants in this discussion were being entirely honest. Proskurov, head of the Intelligence Directorate, was being set up as the scapegoat for the Red Army's failures in Finland. Yet it is interesting that Meretskov, who had good reason to want somebody else to be the scapegoat, did not claim that the intelligence reports were useless, but that the rules made them difficult to read. In fact, only two of the participants appeared to doubt that the rules for safeguarding secret material might not have been the primary factor in causing the books and pamphlets not to be read: Stalin repeatedly accused these documents of being boring, while Proskurov pointed out that not all the materials were, in any event, classified. Thus, while Proskurov's defence was self-

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[281] Alexander O. Chubaryan, Harold Shukman, eds, *Stalin and the Soviet-Finnish War, 1939 - 1940*, pp. 192-201.
[282] Chubaryan, Shukman, eds, *Stalin and the Soviet-Finnish War*, pp. 198-199. Ivan Iosivevich Proskurov was then the Director-General of the General Staff Intelligence Directorate; Kirill Afanasievich Meretskov commanded the Leningrad Military District during the Finnish War [Ibid: xxiv, 283-284]. Italics in original.

serving, nobody directly challenged his assertion that intelligence analyses were not read, suggesting it contained a significant kernel of truth.[283]

Thus, the weaknesses Khalkin-Gol and Finland demonstrated in the chain running from theory to doctrine to training to execution very likely lay specifically in training. Theory moved into doctrine reasonably well, as seen in the reflection of theory in the field regulations of 1929 and 1936. Field experience was analyzed and published, but then languished in safes. The Soviet's initial performance suggests that their training programs were poor overall, which Timoshenko's December 1940 injunction to "Teach troops only that, which is necessary for war, and only thus, as is done in war" suggests was a recognized force-wide failing.[284]

Finland

A few months after the conclusion of hostilities at Khalkin-Gol, the Soviets attacked Finland, a much more public arena. The disastrous performance of the Red Army in the first month of the Winter War is well known, the destruction of the 44th Motorized Rifle Division at Suomussalmi being the most famous example. Carl van Dyke recently described the process by which the Red Army reformed and retrained for eventual success in Finland.[285] The Soviet Air Force appears to have gone through a similar process, with an equally painful beginning and, eventually, a somewhat less painful conclusion.

The terrible weather exacerbated a number of the problems the Soviets faced. Temperatures normally ranged from –25C to –45C and dipped down to –50C for a few days. In the course of 3 months and 13 days of combat, only 24 days provided good flying weather, the rest involving some combination of visibility under 4 kilometres, storms, low clouds and fog. The problems caused by low temperatures should have been

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[283] Chubaryan, Shukman, eds, *Stalin and the Soviet-Finnish War*, pp. 197-200.
[284] Zolotareva, *Nakanune voini*, p. 364.
[285] Carl van Dyke, *The Soviet Invasion of Finland*, (London: Frank Cass, 1997).

foreseen. Just how bitterly cold winter could get in that part of the world should have been no more of a surprise to the Soviets in 1939-1940 than it is claimed to have been to the Germans in 1941. Thus, reports of oils freezing up, and poor facilities for pilots and crews against the cold, indicate poor preparation. Poor preparation is also suggested by very low standards of maintenance.[286]

Bad weather would seem to be a better excuse for poor performance, but the Soviets were unhappy with their results in this regard as well. To their surprise, programs from the NII (Nauchno-issledovatel'nii institut, Scientific Research Institute) intended to train pilots to fly in night and bad weather had almost completely failed – even specialists from the NII could not perform the tasks well. Since many of the pilots had great difficulty flying in formation, let alone manoeuvring in formation, performing these tasks in anything other than clear daylight was almost impossible.[287]

On top of this, bomber pilots were often unable to hit their targets. In one instance, on 26 December 1939, three DB3 bombers attacked a friendly position on a hill, mistaking it for an enemy position. Of 30 bombs dropped, not one hit the hill.[288] In a more general account of the activity of Soviet bombers in the first month of the war, Komkor R. S. Shelukhin, reporting to Defence Minister Voroshilov, stated that:

> Hundreds of bombers are sent, thousands of bombs are dropped, and tens of aircraft are lost, in order to destroy some object (for example: a radio station, a bridge, etc.), the accomplishment of this mission drags out for weeks and in the end loses its intended purpose, and the destruction itself does not lead to the intended goal. This leads to a great waste of resources and pointless loss of strength, as a single zveno [triad of aircraft] should be sufficient for the destruction of one of these objects, if it were well trained with dive bombers and could accomplish the mission on one sortie.[289]

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[286] *Boevie deistviya VVS KBF v voine c belofinami (c 30 noyabrya 1939 g. Po 13 marta 1940 g.)* Moscow: Gosvoenmorizdat NKVMF SSSR, 1941, pp. 6-7, 131-139, *Doklad Komkora R. S. Shelukhina k N.K.O. Marshalu Sovetskogo Souiuza tov. Voroshilovu. 13.1.40.* F. 29, d 26, o. 202, l. 83-87.
[287] *Doklad Komkora R. S. Shelukhina*, l. 77-78; *Boevie deistviya VVS KBF*, pp. 5-6, 136.
[288] *Doklad Komkora R. S. Shelukhina*, l. 81.
[289] *Doklad Komkora R. S. Shelukhina*, l. 80.

Air units repeatedly used the same paths to targets, allowing the Finns to predict their courses and meet them more easily. Additionally, the Soviets seem to have failed to account for increasing means of resistance being sited at a target that was repeatedly struck.[290] Co-ordination problems between the Leningrad Military District's Air Force and the Baltic Fleet Air Force led to several friendly fire incidents and the loss of at least three aircraft before special recognition marks were added to aircraft.[291]

Shelukhin placed the blame for this on the youth and inexperience of the Air Force commanders. Moreover, lessons from previous conflicts were being incorrectly applied: 'Many comrades here received combat experience in Spain, China, and Khalkin-Gol, and here they apply it, without any consideration of the situation….'[292] In prior conflicts, the numbers of aircraft had been small and the crews experienced; the old recipes were failing with inexperienced crews and massed airpower. In Finland, the inexperience was part of the reason that, '…our powerful aviation, with such colossal numerical superiority, could do almost nothing to the enemy in the course of a month.'[293] The Soviets were aware that despite their efforts, traffic moved freely on Finnish railroads and roads, Finnish command and control had remained untouched, and attempts to blockade Finland from outside supply had been a failure.[294]

> Nothing of the sort could occur, if our aviation acted purposefully on the basis of carefully crafted plans and closely calculated operations; if it acted decisively and effectively, with maximal use of its resources.[295]

As this suggests, the Leningrad Military District's Air Force staff had a number of problems over and above the problems that existed in the air units themselves. 7th Army, which controlled the units directly, continually changed their missions, which in turn

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[290] *Doklad Komkora R. S. Shelukhina*, l. 82-84.
[291] *Boevie deistviya VVS KBF*, pp. 19-20.
[292] *Doklad Komkora R. S. Shelukhina*, l. 87-88, quote on l. 88.
[293] *Doklad Komkora R. S. Shelukhina*, l. 88.
[294] *Doklad Komkora R. S. Shelukhina*, l. 88; van Dyke, Soviet Invasion of Finland, pp. 91-93.
[295] *Doklad Komkora R. S. Shelukhina*, l. 89. Emphasis in original.

suggests poor planning and thus poor training of the staff and commanders. While the air staff worked hard to deal with the many and changing requirements, Shelukhin found a distressing lack of operational focus:[296]

> There is no purpose, there is no co-ordination of actions, no calculations, not one planned operation. And people hope to win easily. Therefore there is no battle with enemy aviation [and Finnish air strength is rising].[297]

This lack of a central planning was worsened by theories propounded by F. A. Arzhenukin, who convinced others in the Soviet military that a very limited number of bombs were sufficient to devastate a given area by assuming they would tend to fall in an even distribution: for example, 50 bombs for a hectare of ground. This theory was thoroughly disproven by the evidence that the Soviets had dropped thousands of bombs on some areas to no appreciable effect.[298]

Shelukhin recommended that trained crews and units be brought in from across the Soviet Union in order to bring those units in the Leningrad Military District up to war readiness. This, he hoped, would deal with the persistent problems in training by raising the number of trained crews in combat units. To deal with the problems at the higher echelons, he suggested that all of the Air Force commands be centralized into one command, instead of divided out amongst armies and corps, in order to facilitate the generation of focused operations with specific goals. The recommended operational goals were: suppressing the Finnish Air Force, breaking the Finnish road and rail net, destroying Finnish command and control, isolating Finland from external sources of assistance, and tactical support of the ground troops.[299]

The 50th Rifle Corps, tasked with cracking the Mannerheim Line at Summa, noted a near lack of air support until 30 January 1940. After that, relatively

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[296] *Doklad Komkora R. S. Shelukhina*, l. 89-92.
[297] *Doklad Komkora R. S. Shelukhina*, l. 92.
[298] *Doklad Komkora R. S. Shelukhina*, l. 92-93.
[299] *Doklad Komkora R. S. Shelukhina*, l. 94.

significant bombing strikes up through 10 February totaled some 653 sorties into the Corps' area – a frontage and depth of 6 kilometres. However, bad weather prevented aviation from supporting the actual artillery preparation and initial attack on 11 February, and support thereafter was sporadic at best. A noteworthy success on 18 February, when the 50th Rifle Corps' report claims an artillery reconnaissance aircraft called effective artillery fire onto approaching Finnish reserves near Raiakorpi, serves to highlight the dearth of any other reported employment of aviation.[300]

Despite identifying many problems in analysis, matters did not dramatically improve, unlike Khalkin-Gol. Part of the problem was the uncooperative weather. However, the deeper problems lay in training issues. While these appear to have been overcome at Khalkin-Gol, where the weather was favourable and target areas easier to differentiate, they were not so easily overcome in the Karelian winter and forests. In addition, the scale of operations at Khalkin-Gol was smaller, allowing the Soviets more latitude in filling positions with carefully selected officers. Moreover, the Soviet commander at Khalkin-Gol, Zhukov, proved to be one of their finest officers. Kirill Afanasievich Meretskov, commanding the Leningrad Military District and the 7th Army in the Finnish War, lead a less distinguished career. If Zhukov's legendarily forceful personality had been in command in Finland, would 7th Army still have waffled about assigned missions?

At the war's end, the Red Air Force had not succeeded notably in meeting any of its objectives. Tactical support improved but was often absent. The Finnish road and rail net continued to function despite the bombs dropped in their direction. Finnish command and control was affected somewhat but not critically impaired. Finnish industry and foreign supplies were not slowed. Soviet efforts at terror-bombing towns and villages

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[300] Korneev, Chernov, and Moroz, *Boevye deistviya 50 SK po propyvu linii Mannergeima (s 11.2 po 13.3 1940 g.)*, (Moscow, 1941, Typescript); pp. 41-44, 107-118, 131-132, 234.

produced no useful results and probably stiffened Finnish resistance, as the Soviets should have known from the Spanish war and their own theorists. The results were in no way commensurate with the effort expended. The key measures the Soviets attempted in order to weaken or disrupt the Finns appear to have been offensive counter air, air interdiction against transportation networks, and close air support of Soviet offensives. Once again, they appeared to know the effect they wanted to achieve, but were unable to carry out their intentions in practice: an inability to translate theory and doctrine into execution.[301]

Lessons Learned

From 1936 through 1940, the Soviets engaged in a series of combats of increasing scale. In Spain, when their aircraft were the most modern and their pilots hand-picked, they enjoyed a fair degree of success. The outcome of their effort in China is not entirely clear but seems to have been important around Wuhan, and assisted in keeping a Chinese Air Force in being. At Khalkin-Gol, the local air units were caught flat-footed, but an infusion of expertise and reinforcements rectified the situation. The largest and last of these small wars, against Finland, was also the war with the largest commitment, leaving the Soviets with the least ability to compensate for their problems by bringing in expertise from beyond the combat zone. Coupled with the difficulties of the theatre, the war with Finland exposed both the weaknesses in the combat preparation of Soviet air units and the fact that aircraft which had been world-class a scant 4 years before, over Spain, were already sliding into obsolescence. While in smaller wars the Soviets were able to overcome their problems, the Finnish war was of sufficient scope to overwhelm the ad-hoc solutions that had worked elsewhere.

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[301] *Doklad Komkora R. S. Shelukhina*, l. 94, p. 88; van Dyke, Soviet Invasion of Finland, chapter 4; Korneev et al., *Boevye deistviya 50 SK*; Pavel Aptekar', 'Falcons or Kites? The Red Army Air Force in the Soviet-Finnish War', (*The Journal of Slavic Military Studies*, 4, 1999, pp. 138-148).

The Soviets learned mixed lessons from the loss of 600 aircraft. Smushkevich, by that time Chief of the Air Force, headed a commission formed in 1940 to study the results of the Finnish war. They recognised that Soviet aircraft were too slow overall, the DB-3 heavy bomber was obsolete, and that co-ordination between air and ground forces needed a great deal of work. Furthermore, they recommended that aviation be divided up such that a smaller part was formed into tactical aviation, subordinated to armies, while the majority formed operational aviation, subordinated to Fronts. This was, in fact, an attempt to move the level of subordination of most air units to higher echelons. During the Finnish War, difficulties with coordination between the front lines and supporting air units had been such that the Soviets had attempted to subordinate most air units to ground armies. Smushkevich's commission concluded that this over-concentration of force lead to inflexibility in concentration. Furthermore, army staffs tended to plan air missions without especial regard to their utility: Smushkevich noted both that bombing missions in support of quiet sectors were largely pointless, and that, 'There was a race for the greatest number of sorties and tonnages of bombs dropped, without consideration of what tactical or operational effects they might achieve.' (The latter, presumably, was an unintended consequence of rating air unit effectiveness in terms of tonnages dropped.) Finally, the practice of direct subordination to armies caused operational missions to be short-changed in favour of strictly tactical support. Despite these criticisms, however, armies continued to have aviation in direct subordination until the spring of 1942, and on the eve of war, in June 1941, almost 60% of Front aviation was subordinated to armies.[302]

Some matters were altered in the new manuals for fighter aviation (BUIA-40) and bomber aviation (BUBA-40) though not all the changes were for the better. In accordance with the Soviet tenet of massed employment, BUBA-40 usefully specified

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[302] Aptekar', 'Falcons or Kites?', pp. 146-147; Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 177-178, Kokoshin, *Armiia i Politika*, p. 100; Migulin, *Teoriia i praktika*, pp. 69-70, 89-90.

that concentrated bombing was preferable, either through the use of regiments at a time on a single target, or by echeloning the strike into a rapid series of strikes by smaller groups. On the other hand, BUIA-40 dismissed the use of radio in combat. T. T. Khriukin[303], who commanded an army's air units in Finland, was convinced by this experience of the need for direct radio communications between air units and the ground units they supported, in order to enable direct communication for the designation of targets. While BUBA-40 and BUIA-40 both claimed to take into account lessons learned at Khalkin-Gol, but one of the lessons learned at Khalkin-Gol was the need for a light, reliable, long-range radio in all fighters. Additionally, the *1939 Provisional Field Regulations* were still in effect, which permitted the attachment of air units down to corps. The greatest weakness of the Soviet Air Force, however, was training. Many of the fixes for problems in Finland turned out to be a matter of organizing matters precisely as written in the manual, especially the cross-posting of staff officers between air and ground HQs to arrange signals, times, places, and targets.[304]

Smushkevich also concluded that the Red Air Force was in no state to counter the Luftwaffe. While an accurate assessment, Smushkevich along with his Chief of Staff, F. A. Arzhenukin, and Air Force Commissar Agal'tsov, were removed from their posts for having the temerity to present that conclusion. Smushkevich's replacement, P. A. Richagov, was a veteran of the Spanish war and had served in China.[305]

However, the majority of the other conclusions were not new. The weaknesses of various aircraft were becoming apparent during Khalkin-Gol, and the development of

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[303] Timofei Timofeevich Khriukin joined the Soviet Air Force in 1932, serving as a pilot in Spain, the commander of a bomber group in China, and commanded an Army's air units in Finland. He commanded the Air Armies of various Fronts during the Second World War. Died in 1953. (V. A. Zolotareva, et al., *Nakanune voini*, p. 203.)

[304] Migulin, *Teoriia i praktika*, pp. 71-81; Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 158-159, 163, 178; T. T. Khriukin, p. 203, in V. A. Zolotareva, et al., *Nakanune voini: Materiali soveshchaniia vishchego rukovodiashchego sostava RKKA 23-31 dekabria 1940 g.. Russkii arkhiv: Velikaia Otechestvennaia, T. 12(1)*, (Terra: Moscow, 1993).

[305] Aptekar', 'Falcons or Kites?', pp. 146-147, Migulin, *Teoriia i praktika*, pp. 89-97.

replacements had been accelerated.[306] The DB-3 bomber was already undergoing a modernization so extensive that the resulting Il-4 is only dimly reminiscent of the DB-3.[307] The need for speed in aircraft of all types had been a matter of debate within the ranks of Soviet air theorists, with those favouring speed as the prime factor in a combat aircraft already winning the debate. Some of Smushkevich's recommendations on organization were put into effect. By the beginning of 1941, the Air Force had been reorganized from its older organization, with a split between High Command Reserve/Special, Front, Army, and Troop aviation, to something closer to Smushkevich's suggestion: a split between High Command Reserve Aviation, which was mostly bombers; Frontal Aviation, in which each Front possessed at least a division of each of bombers, fighters, and reconnaissance aircraft; and Army Aviation, with each Army possessing its own mixed air division, of one regiment of each of bombers, fighters, and assault aircraft.[308]

What did not happen was an improvement in training, an area where both Khalkin-Gol and Finland revealed serious weaknesses. The purges can only bear part of the blame. The dramatic expansion of the Soviet military in the 5 years before Barbarossa also played a distinct role. In 1938 the Red Army had 1.5 million men. By June 1941, it numbered five million with a trained reserve of fourteen million. This massive, rapid expansion would have produced a shortage of trained officers at the best of times; the purges sharply exacerbated the problem.[309] Moreover, the Air Force suffered problems with basic pilot training.

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[306] Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 177-178, Kokoshin, *Armiia i Politika*, p. 100.
[307] B. V. Shavrov, *Istoriia Konstruktsiia samoletov SSSR 1938 – 1950 gg.*, (Moscow: Mashinostroenie, 1994), pp. 31-33.
[308] Migulin, *Teoriia i praktika*, pp. 107-108.
[309] Erickson, *Soviet High Command*, ch. XIV - XVI; M. M. Kirian, 'Nachalnii period Velikoi Otechestvennoi voini', *Voenno-Istoricheskii Zhurnal*,, 6, 1988, pp. 13-14; Ryzhakov, 'K voprosu', *Voenno-Istoricheskii Zhurnal*, 8, 1968, pp. 105-111) pp. 109-111; David Glantz, 'Mobilization and Force Structure: Soviet Mobilization in Peace and War, 1924-1942: A Survey', (*The Journal of Soviet Military Studies*, V. 5,

In January 1937, the Air Force had 12 flight schools providing basic flight training before pilots were sent to their units for conversion and advanced training. By June 1941, it had 83. This massive expansion produced an ever-growing number of graduating officers: 8,713 in 1938, 12,337 in 1939, and 27,918 in 1940. However, output of officers did not keep pace with the increase in the number of schools due to a number of shortfalls illustrated by the 50% shortage of aircraft, 60% shortage in fuel, and, most importantly, 44% shortage in instructors in early 1941. Thus, those 83 schools could as easily be considered 40 given that the average school was missing half of its planes and instructors. Moreover, the basic flight training regimen was shortened seven times in 1939 and 1940, bringing the peacetime training program to the span of that used in wartime. In 1940, the Soviet Air Force faced a shortfall of some 60,000 Air Force officers, including 6,000 officers were dismissed from the Air Force and arrested during the purges. Since the weight of the purges fell most heavily on the upper ranks, turnover in command positions was extremely rapid. In early 1941, two thirds of Military District (effectively, Front) Air Force commanders and chiefs of staff, and 97% of all air brigade and corps commanders and chiefs of staff, had held their posts for less than a year. It is thus no great wonder that Shelukhin commented that one of the greatest problems in the Finnish War was that commanders were not only 'youthful and inexperienced', but indeed so inexperienced that they did not realize their own incompetence and therefore were not seeking to improve. Worse, the purges tended to kill the brightest and most efficient, while sparing those best at kowtowing to the latest party line. As a result, the officers suddenly

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No. 3, September 1992), pp. 332-348; V. Shlykov, 'I tanki nashi bystri`, (*Mezhdunarodnaya zhizn'*, 9, 1988, pp. 117-129), p. 125.

catapulted beyond their training and experience frequently had poor mentors to guide them in their new jobs.[310]

Whatever their manuals and theories claimed, the Achilles Heel of the Soviet Air Force was implementation, a problem they shared with the Red Army. In addition to the troubles with training, there was a grave problem with the dissemination of experience. The Soviets placed a premium on the 'analysis and generalization' of war experience, a process which certainly occurred with respect to Spain, Finland, Khalkin-Gol, and probably occurred regarding the conflict in China. Nonetheless, despite extensive analysis, some of it quite incisive, the Red Air Force demonstrated a consistent pattern of failing to learn from its previous errors, even when those errors had been identified and practical solutions written out. Units at Khalkin-Gol were thus oblivious to experience from Spain and China, and those in Finland unaware of lessons from Khalkin-Gol.

Clearly, a key problem the Soviet Air Force experienced in its wars from 1936 through 1940 was an increasing inability to avoid using a rising number of poorly trained personnel as the scale of the wars, and the scale of their training shortfall due to rapid expansion, both increased. Moving our focus from the Soviet's practical, day-to-day problems, to the realm of theory, we find that the experience of the small wars from 1936 through 1940 had wrought a number of changes. One of the most dramatic impacts of war experience on theory was the success of Soviet fighters over Madrid in 1936, which destroyed the theory of bomber's invulnerability, and demonstrated both the viability of fighter interception along with the need for fighter escort.

As noted in the previous chapter, in 1936 the fighter's fortunes in Soviet theory were falling, shot down by a wave of optimism about the ability of fast, heavily-armed bombers to fight their way through to targets in the face of fighter opposition. This was

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[310] Fedorenko, N. 'Podgotovka letnykh kadrov v 1939 - 1941 gg', (*Voenno-istoricheskii zhurnal*, 4, 1976, pp. 100-103), p. 101; Komal, F. B. 'Voennie kadri nakanune voini', (*Voenno-Istoricheskii Zhurnal*, 1, 1990, pp. 21-28), pp. 21-28; *Doklad Komkora R. S. Shelukhina*, l. 88.

based in large measure on optimism about the ability to mount heavy armament in bomber turrets and a supposed superiority in fire this would generate, during a period in time when the speeds of bombers and fighters were about equal. In 1936, the equality in speed was beginning to disappear as a newer generation of fighters came off the drawing boards, as exemplified in 1938 by the ability of the German Me-109 to intercept the Soviet SB ('skorostnoi bombardirovshchik' or 'fast bomber') which had hitherto proven too fast to intercept. The interception of bombers over Madrid by Soviet fighters made it politically difficult to avoid the conclusion that fighters could indeed be an effective defence against bombers. The interception of the SB drove home the point that newer, faster fighters could overtake bombers designed for speed. The bomber's proponents went into a relative decline from this point, leaving only P. Ionov to argue for them over fighters, and by 1940 even Ionov had conceded that the fighter was a 'deadly threat' to the bomber. Madrid brought the fighter back out of the wilderness, and the Me-109's appearance prompted focused work on a newer generation of fighter aircraft. This search was intensified after Khalkin-Gol, and the resulting aircraft began to enter service in 1940-1941.[311]

The Pe-2 and Il-2 stand out of the above list because they are not fighters. The development of these aircraft, too, was prompted in part by experience in Spain. A low-level 'shturmovik' assault aircraft for close air support had been desired for some time. The bomber mania shortly before the Spanish war had driven the idea into decline, but Guadalajara, for all that it is a problematic example in retrospect, lent great credibility to the concept of the low-level shturmovik style of close attack aircraft. Engine technology limitations defeated Soviet design efforts in the 1920s. In the late 1930s, engine technology caught up with their desires, and the Il-2 close-attack aircraft was born and

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[311] Avdeenko, P., 'Sovetskoe samoletostroenie v gody predvoennikh piatiletok (1929 - 1940 gg.)', (*Voenno-istoricheskii zhurnal*, No. 7, 1974, pp. 86-89), pp. 87-89; Novikov, *Boevie deistviia na Khalkhin-Gole*, p. 177-178; P. Ionov, 'Operativnoe iskusstvo VVS', (*Vestnik Vozdushnogo Flota*, July 1940, pp. 9-17), p. 17.

went on to be the most famous Soviet aircraft of the Second World War.[312] The Pe-2 dive-bomber began to be reworked from a high-speed interceptor project in May 1940 and went on to be the mainstay of their light bomber force as both a level and dive bomber. The existence of the programs to develop these two bombers, as well as the programs to develop new fighters, is part of the evidence that the Soviet leadership understood the changing requirements of aerial warfare.

Against this background, Defence Comissar S. K. Timoshenko's conclusion at the December 1940 conference, at the Soviet Air Force lacked unity regarding the conduct of operations may seem odd. However, his assessment was simultaneously perfectly accurate, and quite untrue. The conference in December 1940 served to highlight the differences in opinion, but also shows the areas where everyone agreed.[313]

The Conference consisted of a series of papers on major issues of offence, defence, and training, each followed by discussion from the floor. The speakers were all major figures, one of the highlights being an extensive paper on the 'modern offensive operation' by G. K. Zhukov. The discussions, while civil, were contentious and to the point. As a case in point, witness F. N. Remezov, commander of the Orlovskii Military District, calling Zhukov to task for his desire to introduce the exploitation force into the breach to early, thereby getting it caught in the breakthrough battle – a penchant Zhukov went on to demonstrate repeatedly in World War II.[314] Only one of the papers dealt solely with the Air Force, but nearly all of them considered the roles of the Air Force in the topic under discussion.

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[312] Interestingly, the hedge-hopping attack profile of the Shturmovik was apparently an idea imported from Italy in the mid to late 1920s. M. Vladimirov, ''Breyushchii poliot' i poliot na maloi visote', (*Vestnik vozdushnogo flota*, 1, 1929, pp. 16-18), p. 16. On the Soviet's enthusiastic adoption of the idea, see both Vladimirov`s article and A. Turzhanskii, 'Shturmoviye deistviya po kollonam na pokhode s primeneniem 'breiushchego poliota'', (*Vestnik vozdushnogo flota*, 1, 1929, pp. 14-15).

[313] S. K. Timoshenko, 'Closing Speech`, p. 357, in V. A. Zolotareva, et al., *Nakanune voini.*

[314] F. N. Remezov, p. 170, in V. A. Zolotareva, et al., *Nakanune voini.*

The single hottest topic regarding the Air Force was one that had long been a point of contention: how to gain air superiority, and what exactly air superiority meant. The Spanish war had restored the fighter to its rightful place as an effective means of aerial combat. However, the debate over the usefulness of fighters was, at its core, a debate over where air superiority should be achieved: by aerial combat, by bombing airbases, or by bombing factories? Even the proponents of the invincibility of bombers had been convinced that their aerial battleships would be trading fire in the skies, and while it became clear these battles were fantasies, the debate's core question remained unanswered.

Of least interest to the Soviets was the option of directly bombing enemy factories. While such operations are repeatedly mentioned by Soviet authors, the option of factory bombing also, almost always, seems to be included out of a desire for completeness that pervades many potential-mission laundry lists they put together. When the discussion becomes more specific, deep bombing almost always departs from the picture. Factory destruction was an option the Soviets were aware of, and theoretically interested in, but it was not a priority in their minds. In S. K. Timoshenko's words,

> The decisive effect of aviation is not gained through raids on the deep rear, but through combined actions with troops on the battlefield, in the region of a division or army.[315]

As a consequence, when the Soviets discussed air superiority, they tended to mean what they called operational air superiority – over a specific area for a given duration – as opposed to what they called strategic air superiority, in which the enemy air force was completely on the ropes through the destruction of its forces and also the destruction of the industrial and training sources of its forces, and they periodically reminded each other of the difference between these two notions. The need for operational air superiority was

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[315] S. K. Timoshenko, 'Closing Speech', p. 340, in V. A. Zolotareva, et al., *Nakanune voini.*

unquestioned: Zhukov's declaration that 'Mastery of the air is the basis of the success of an operation'[316] went down without any murmur of protest.

Thus, the central debate lay between achieving air superiority through aerial combat, or through bombing enemy airbases. On this issue, the two camps broke down along lines based on the experience they saw as relevant. In Spain, China, and Mongolia, while strikes on airbases had been initially successful, dispersal and maskirovka soon largely overcame the ability of either side to effectively locate and strike the other's bases, to such an extent that at least 40% of strikes sent out failed to find a valid target. By contrast, the Luftwaffe demonstrated in Poland and France that it was indeed possible to launch a massive, concerted strike on enemy airbases and achieve operationally decisive results. The Soviets credited the Germans with a numerical advantage in France that had not in fact existed, but this error did nothing to obscure the essential result. A series of articles and official analyses of Poland and France relentlessly pointed up the same conclusion: the Luftwaffe had, twice, inflicted disaster upon its opponents by means of a very carefully planned and executed strike which focussed as much air power as possible on achieving a surprise strike on enemy airbases to disrupt operations and destroy equipment, followed by repeated concentrated hammer-blows on those airbases to ensure that the enemy could not recover before the ground forces made the issue of recovery irrelevant.[317]

Nonetheless, argument over the credibility of doing significant damage to an enemy air force through strikes on airbases broke out twice during the 1940 conference. The first was sparked by a comment of Zhukov's, in his paper on Front offensive

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[316] G. K. Zhukov, 'Character of the Modern Offensive Operation', p. 139, in V. A. Zolotareva, et al., *Nakanune voini.*

[317] See, for example: B. A. Pogrebov, 'Vozdushnie sili v germano-pol'skoi voine', (*Vestnik vozdushnogo flota*, June 1940, pp. 13-24); E. Chalik, V. Lozovoi-Shevchenko, 'Deistviia aviatsii na zapadnom fronte', (*Vestnik vozdushnogo flota*, August 1940, pp. 14-39); B. M. Lozovoi-Shevchenko, 'Vozdushnoe razvedka aerodromov', (*Vestnik vozdushnogo flota*, September 1940, pp. 11-21); E. F. Burche, 'Maskirovka VVS v voine na Zapade', (*Vestnik vozdushnogo flota*, September 1940, pp. 55-60); Razvedivatel'noe Upravlenie Genshtaba Krasnoi Armii, *Deistviia VVS v voine na zapade*, (Moscow, 1940).

operations, that '…mastery [of the air] is gained through the bold and unexpected powerful blow of the entire VVS on the enemy's aviation in its basing regions.' G. M. Shtern, veteran of Spain, Mongolia, and Finland, and, at the time of the conference, commander of the Far Eastern Front, disagreed mildly, reminding the assembly that aerial combat was at least as important. Greater disagreement on base strikes came from P. V. Richagov's paper, immediately following Zhukov's, on the battle for air superiority. Richagov had served in Spain, China, and Finland, and was Chief of the Main Directorate of the Red Army Air Force at the time of the conference. While recognizing that strikes on enemy airbases were necessary, he also declared that the complexity and difficulty of the operation was such that, 'Most such strikes will not succeed.' D. T. Kozlov, who commanded a rifle corps in the Finnish War and was the Chief of the Main Directorate of Air Defence during the conference, argued briefly with Richagov over the efficiency of base strikes, insisting on the need to concentrate all available Frontal aviation on the first day of the operation against the enemy air force, bomb their airbases, and thereby prevent the enemy air force from interfering with ground operations. M. M. Popov, then the commander of the 1st Red Banner Army of G. M. Shtern's Far Eastern Front, and a veteran of the Russian Civil War (but not Spain, China, Mongolia, or Finland), argued that base strikes were only of use in the initial period of a war. Strikes on Poland and France had depended heavily on surprise, and even these, with their 'colossal' results, had left enemy aircraft flying – Popov cited an (incorrect) report of Polish aircraft destroying some 100 German tanks in one raid. After the initial strikes, the enemy dispersed, and, as at Khalkin-Gol and the Battle of Britain, repeat strikes needed much greater numbers of both bombers and escorts to achieve far less stunning results. Several speakers supported Popov, leaning especially on their experiences in Spain and Khalkin-Gol for support of

the notion that, without a high degree of surprise, results such as the Luftwaffe had achieved were not possible.[318]

In the end, Smushkevich and Richagov, who both in their separate ways insisted that destruction in the air and on the ground were both important, capped the argument.[319] This is not, in fact, the compromise position it may at first seem, but recognition, by both speakers, of both the possibility and the difficulty of doing major damage to the enemy air force through strikes on air bases. Moreover, such an attitude fit in well with the prevailing attitude regarding the proper employment of the air force. Smushkevich demonstrated this in his commentary:

> Only through proper organization of our rear area, good training of our flight crews, provision of sufficient airbases and communications, ammunition, fuel, through clever and very frequent manoeuvre in order to deceive the enemy, can we achieve predominant mastery of the air on defined axes, on defined sectors and only at defined times.
>
> It is possible that the war now underway between England and Germany, if the nerves of the English leadership do not break, may continue for several years despite ceaseless raids on Birmingham, Liverpool, even given great German superiority, [discusses basing locations], all the same the end result will be decided not in the air, but on the ground, when the ground forces enter the war.[320]

What Smushkevich's comments point towards is the linkage between Soviet attitudes on the proper employment of their air force and their attitudes on air superiority. Most – though not quite all – of those at the conference, and of those writing in Soviet journals, contended that the central mission of the Air Force was to support the ground forces, and, specifically, to provide overwhelming support during major offensive operations. A. N. Lapchinskii was not at the conference, having died, apparently of

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[318] G. K. Zhukov, 'Character of the Modern Offensive Operation', p. 139; G. M. Shtern, p. 160; P. A. Richagov, 'Voenno-Vozdushnie Sili v nastupatel'noi operatsii i v bor'be za gospodstvo v vozdukhe', p. 177 (quoted); D. T. Kozlov, pp. 182-185; M. M. Popov, pp. 185-188; E. S. Ptukhin, pp. 188-190; G. P. Kravchenko, pp. 192-194; all in V. A. Zolotareva, et al., *Nakanune voini.* E. S. Ptukhin, then commanding the air forces of the Kiev Special Military District, had taken part in the Spanish and Finnish wars; G. P. Kravchenko, then commander of the air force of the Baltic Military District, served in China and at Khalkin-Gol.

[319] Ia. V. Smushkevich, pp. 197-198; P. V. Richagov, pp. 206-207, both in V. A. Zolotareva, et al., *Nakanune voini.*

[320] Ia. V. Smushkevich, pp. 197, in V. A. Zolotareva, et al., *Nakanune voini.*

natural causes, on 2 May 1938. The publication of his final book, *Vozdushnaia armiia* (*The Air Army*), in 1939 suggests that, indeed, he was not a victim of the purges. In his final book, he argued forcefully for smaller aircraft capable of supporting the ground forces, noting that,

> Aviation appeared in warfare as a new, powerful offensive factor. From this the logical conclusion is the unity of action of ground and air forces for the achievement of overall success....[321]

Looking over the course of Soviet air theory from 1918 to 1940, this is the single greatest point of agreement. Not everyone subscribed to this at any given time. Indeed, in the period leading up to the Spanish Civil War, many were headed in the other direction, and beginning to vocally favour the use of deep-raiding heavy bombers instead of staying directly linked to the ground war. Those attitudes, linked closely to assumptions that fighters were useless, fell by the wayside after the air battles over Madrid and Guadalajara, and within a short time the Soviet viewpoint was largely back in its accustomed place. Some still argued for strategic bombing, even at the 1940 conference, but they formed a small minority. Long-range bombing was not dismissed, nor was it viewed as entirely undesirable – but most of those who mentioned it made it clear it took a distant second place to direct tactical and operational support of the ground forces. Long-Range Aviation existed, and had bombers, and got periodic lip service; but Frontal and Army aviation were the centre of attention, and Smushkevich's declaration explains,

> 'It is already clear that only close cooperation between all forces subordinate to an all-arms Front or Army provides success in operations and war, and thus the only place of aviation is in all-arms battles and operations.'[322]

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[321] M. Irtiuga, 'Kombrig A. N. Lapchinskii', (*Voenno-istoricheskii zhurnal*, 7, 1972, pp. 122-125), p. 125: A. N. Lapchinskii, *Vozdushnaia armiia*, (Moscow: Voenizdat, 1939), pp. 15-16, 88-120, 144-146; quote on p. 97.

[322] Ia. V. Smushkevich, p. 197, in V. A. Zolotareva, et al., *Nakanune voini.*

These statements about the need for concentration of force on limited axes, closely tied into and supporting the operations of the Army, and the use of strikes on airbases at the outset of a major offensive, should not seem unfamiliar. In fact, all three were closely connected themes in Soviet Air Force thinking from the time of its inception. 'When the infantry loses, everyone loses'[323] is a fact that cannot be ignored by a continental power. As a result, '*Ground forces must not be deserted by aviation in their day of need*'.[324] It logically follows that, for powers with hostile land frontiers, tactical and operational support will almost always be at centre stage; and, indeed, this has tended to be the case historically. Since there are never enough resources to go around, the resources of the Air Force should be applied in the manner that will get the best results, though massed support of major land offensives. The massed support not only ensures maximum bombing power to assist the ground forces, but also the numbers to assist in gaining air superiority.

However, while virtually all Soviet theorists would have agreed with the logic laid out in the previous paragraph, they were far less unified on the issue of organising it. We have just discussed the 1940 version of the long-running battle between advocates of air superiority through airbase bombing and advocates of air superiority through fighter combats. In some ways, this long-running argument may seem similar to religious arguments over salvation through faith or good works; both lend themselves to the compromise solution of using both methods. However, the problem of base strikes or fighter combats was not merely a question of the potential effectiveness of each method. Linked to that debate was the question of air force organisation. The issue of organising aircraft into squadrons and regiments was not much at issue. However, the question of

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[323] Lee Kennet, 'Strategic Bombardment: A Retrospective', (R. Cargill Hall, ed., *Case Studies in Strategic Bombardment*, (Washington: USGPO, 1998), pp. 623-632), p. 625, commenting on the article by Richard J. Overy, 'Strategic bombardment Before 1939', (Hall, ed., *Case Studies in Strategic Bombardment*, pp. 11-90), pp. 74-75. Overy makes the case in somewhat more detail; Kennet's is a pithy summation.
[324] A. Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 47. Emphasis in original.

what air units, of what size, should be attached or subordinated to what ground units, and with what degree of permanence, was of great importance. In this regard, the Soviets were divided.

The question of air unit subordination was tangled because the solution was difficult. The most common subject of contention - to whom a close support regiment should be subordinate – serves as a good example. Obviously, the regiment needed to be able to provide timely support and be well briefed on the operations of the supported unit. This could, in theory, be accomplished by permanently attaching the air regiment to a ground corps. Unfortunately, this would also mean the regiment would likely be unavailable to support any other corps. If the regiment was temporarily attached, the degree of inflexibility dropped, but the ease of co-operation also dropped. If all regiments were kept subordinate at the Army level, or Front level, the ease of concentrating their firepower on the necessary axis became correspondingly easier, while the potential difficulty of cooperating with a given ground force unit became greater. Thus the dilemma: flexibility of concentration, or flexibility in cooperation?

In fact, the key problem underlying the issue was not attachment, but communications. Here, as elsewhere in the Soviet military, the weakness of signals assets made itself felt. The core reason that an air regiment directly and permanently attached to corps gave better results to that corps lay in the ease of communication between the two staffs. Co-located and needing to send signals over only short distances, it was simpler to work out the communications. Temporary subordination removed some of the ease by removing the day-to-day familiarity with each other's operations. Not subordinating the air units at all usually ensured that all communications between the supported ground unit and the supporting air unit had to go through some higher headquarters. Part of the solution to the problem was the attachment of air staff officers to the headquarters of

supported units, and manuals, theoretical works, and Conference participants all recommended this solution. However, the true sword for this Gordian Knot was better and more plentiful communications equipment and personnel. One of the Conference participants, T. T. Khruikin, suggested a specific remedy to the problem: ensure radio communications with the ground where the support was needed, and then air units could be held as Front assets for flexibility in concentration while still retaining flexibility to do precisely what the front line forces needed.[325] Eventually, the Red Air Force would come to this solution.

In the meantime, the topic was hotly debated. Smushkevich favoured retaining all air units at the Front level, while Richagov favoured splitting air units between Army and Front, with Army air units providing direct tactical support, while Front air units fought for air superiority and conducted operational missions. Virtually ever other speaker on Air Force topics also had an opinion on the subordination, if only in passing. As previously noted, in Finland, their largest recent engagement, the Soviets had attached much of their airpower at the Army level, thereby short-changing support for operational missions but generating better cooperation, and this organization was to persist until after the outbreak of Barbarossa. Not for nothing was one of S. K. Timoshenko's orders to the Air Force, given in his closing speech at the Conference, 'learn to cooperate with the ground'.[326]

One reply to Timoshenko's assertion, albeit proffered before Timoshenko's speech, came from Smushkevich:

> All our problems amount to this: we happily read the article of some correspondent, especially if translated, but our own manuals we do not read and do not know.

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[325] T. T. Khriukin, pp. 203, in V. A. Zolotareva, et al., *Nakanune voini.*

[326] Ia. V. Smushkevich, p. 197, P. A. Richagov, 'Voenno-Vozdushnie Sili v nastupatel'noi operatsii i v bor'be za gospodstvo v vozdukhe', p. 176-180, S. K. Timoshenko, 'Closing Speech', p. 366, in V. A. Zolotareva, et al., *Nakanune voini.*

> … Our problems stem from the fact that we do not bring into life that which we know; troubles because we do not teach our VVS how to carry out the forms of combat employment of the VVS which we know.[327]

Smushkevich was both right, and wrong. Officer training was an area of deep problems, as discussed above. Purges, inexperience, and over-rapid promotion made it difficult to keep commanders on top of their tasks. However, the other side of the coin is that the Soviet manuals and textbooks were often not terribly helpful. While usually free of ideological cant, the manuals often failed to be sufficiently specific or to give more than general guidance in the solution of problems. When read by a commander who already knew his business, they might provide excellent food for thought, and the issues of practical implementation that the manuals frequently glide past could be filled in from the commander's experience. When an inexperienced commander looked at them, the result was likely to be confusion. The laundry lists of methods and targets that plague their 1930s textbooks, devoid of explanations of their relative importance, ease of use, utility in various situations, or practicality, cannot have eased the job of a neophyte commander. The Soviets did learn to reverse this trend, albeit at great cost.

An excellent example of this trend is found by comparing A. K. Mednis' 1935 *Taktika shturmovoi aviatsii: uchebnik dlia letnikh shkol i stroevikh chastei VC RKKA* (*Tactics of Close Support Aviation: Textbook for Flying Schools and Line Units of the RKKA AF*) with S. S. Krupin's 1946 *Shturmovoi aviakorpus vo vzaimodeistii s tankovim korpusom pri razvitii proriva fronta (uchebno-metodicheskii material)* (*The Close Support Air Corps in Cooperation with a Tank Corps During The Development of a Breakthrough (study-training material)*). Mednis' book is smoother reading, and discusses a wide variety of possible employments of close support aviation on a laundry-list approach. Readers will come away from it with a general idea of things that close support aviation might attempt to do. Krupin's two-volume work is a more difficult, but

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[327] Ia. V. Smushkevich, p. 196, in V. A. Zolotareva, et al., *Nakanune voini*.

more rewarding, read. The reader is led through an extremely detailed, very concrete example of the provision of support in a situation both archetypal and quite complex: providing close support for a fast-moving mobile formation. The first volume details the mission, orders, and situation; the second, somewhat larger, volume details the solution to the problem, including a complete set of orders, and detailed maps of communications nets. Mednis' book, typical of pre-war manuals, might well prove helpful to a well-informed officer, but will leave the recent initiate at sea, unsure of 'what do I do now?' when faced with reality. Kuprin answers the neophyte's question, and gives the seasoned officer something to ponder in the light of experience. The second might not spark the imagination, but it provides a concrete basis on which to conduct real-world operations.[328]

Timoshenko's closing speech at the Conference provided an incisive and damning look at the state of the Soviet Air Force. He reiterated that the role of the Air Force was tactical and operational support, ruling out raids on the enemy deep rear; and went on to state in more detail that the Air Force's primary missions were air superiority, tactical support during the breakthrough operations, and continuous support during exploitation. This was not a particularly controversial statement, as it summed up the central point of agreement in Soviet thinking about the Air Force over the past twenty years. He criticised the Air Force for failing to analyze or study its extensive experience – a criticism that was not entirely accurate, since the experience had been studied, but the results of the study appear not to have reached or helped line units. More controversially, he continued,

> ...the leadership of the VVS does not have a unity of views on such questions as the nature and conduct of an operation, assessing the enemy, methods

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[328] Mednis, A. K., *Taktika shturmovoi aviatsii: uchebnik dlia letnikh shkol i stroevikh chastei VC RKKA*, (Moscow: Voenizdat, 1935, 1st ed.); Krupin, S. S., *Shturmovoi aviakorpus vo vzaimodeistii s tankovim korpusom pri razvitii proriva fronta (uchebno-metodicheskii material). Chast 1-ia: Zadanie*, (Moscow: Voennaia Krasnoznamennaia Akademiia Komandnogo i Shturmanskogo Sostava VVS Krasnoi Armii, 1946); Krupin, S. S., *Shturmovoi aviakorpus vo vzaimodeistii s tankovim korpusom pri razvitii proriva fronta (uchebno-metodicheskii material). Chast 2-ia: Reshenie*, (Moscow: Voennaia Krasnoznamennaia Akademiia Komandnogo i Shturmanskogo Sostava VVS Krasnoi Armii, 1946.)

> of conducting aerial warfare and bending the opponent to our will, choice of target, etc.
>
> We must bring order to this area, and the sooner, the better.[329]

In other words, Timoshenko accused the Air Force of a general failure to agree on the specifics of how it was to accomplish its tasks. The articles in Soviet journals, the vague nature of their manuals, the arguments in the 1940 Conference, and their often-poor showing in combat all suggest that this criticism was perfectly accurate. The Soviet Air Force agreed that it existed to support the ground forces. It did not agree on the priorities that flowed from this, or on the means of accomplishing the tasks suggested by those priorities. Was ground support more important than air superiority? How was air superiority to be achieved, and how was ground support to be organised? The Soviet Air Force had failed to provide clear and effective answers to these critical questions.

In keeping with his central slogan, 'Teach the troops only that, which is needed in war, and only thus, as is done in war', Timoshenko ordered the Air Force to work out its problems: to come to agreement on tactical and operational issues, to solve the problem of cooperation with the ground, and, indeed, to learn to maintain its aircraft. The need for more and better training was stressed repeatedly, and, prophetically, Timoshenko reminded the Air Force that it needed to figure out how to accomplish its missions even in conditions of numerical inferiority.[330]

In December 1940, though they did not know it, the Soviets had half a year to prepare. In June 1941, Hitler launched his stukas east. Despite beginning with a tremendous numerical advantage, the VVS swiftly found itself in a position of numerical inferiority and desperately grappling with the question of how to help the Red Army stave off defeat while preventing its own annihilation at the hands of the Luftwaffe. All the

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[329] S. K., Timoshenko, 'Closing speech', p. 357, in V. A. Zolotareva, et al., *Nakanune voini.*
[330] S. K., Timoshenko, 'Closing speech', p. 338-366, in V. A. Zolotareva, et al., *Nakanune voini.*

problems the VVS had failed to resolve since its inception now had to be solved while waging the largest land war in history.

Chapter 4
The Great Patriotic War, 1941-1945

From the perspective of a later observer, the various small wars of 1936 to 1940 look like dress rehearsals for the main event, whose curtain rose in spectacular fashion on 22 June 1941. The German invasion of the Soviet Union initiated the largest land war in history. All branches of the Soviet military were hard hit at the outset of Barbarossa, and among those hit hardest was the Air Force. Its aircraft, parked in dense formations, devoid of camouflage or defense, were caught completely by surprise by the Luftwaffe's initial strike. The Luftwaffe swiftly gained near-total air superiority and used it to assist the Wehrmacht in driving deep into the Soviet Union. Yet the Soviet Air Force recovered from this disastrous beginning and, eventually, reversed it. Von Hardesty aptly compares this course of events to the legendary phoenix, which dies in flames only to arise renewed from the ashes. The scope of the disaster that overtook the Soviet Air Force in the summer of 1941 is staggering: 1,339 aircraft lost on the first day of the war, 2,046 in the first week, 5,098 in the first month, and 8,166 by the end of October. As their aircraft in the western Soviet Union totaled 8,472 aircraft in June 21, 1941, the Soviet Air Force thus suffered nearly 100% losses from its deployed forces in four months.[331] The explanation for this immolation lies, first and foremost, in the Soviet Air Force's state of readiness.

Overall, the Soviets had 7,133 aircraft in the various military districts along their western border, plus 1,339 aircraft in DBA (Dal'naia Bombardirovochnaia Aviatsiia, Long-Range Bomber Aviation) units stationed in the western Soviet Union. On paper,

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[331] A. N. Efimov, '1941 god – opit planirovaniia i primeneniia voenno-vozdushnikh sil, uroki i vivodi', (V. E. Pan'kin, ed., *1941 god – opit planirovaniia i primeneniia voenno-vozdushnikh sil, uroki i vivodi (po materialam voenno-nauchnoi konferentsii rukovodiashchego sostava tsentral'nogo apparata VVS. posviasshchennoi 70-letiu Sovetskoi Armii I Voenno-Morskogo Flota)*, (MO SSSR Tsentr operativno-takticheskikh issledovanii VVS, Moscow, 1989), pp. 6-22), pp. 10-11, 19. There were 7133 aircraft in the aviation of the western military districts, plus 1339 aircraft in Long-Range Bomber Aviation.

this was a formidable force. In total, the Soviet Air Force comprised 19,583 aircraft in 266 air regiments, many of which, in the internal regions of the Soviet Union, were meant to act as replacement aircraft, crews, and units for losses in the event of a war. The number of aircraft in the western military districts had risen steadily over the first half of 1941, to the levels shown in Table 1, which displays a breakdown of the aircraft in the various border military districts on the eve of the war. The '% of a/c' line shows the percentage of each type of airplane against the total number of planes in the western military districts. The 'new-model aircraft' shows the number of newer aircraft that had arrived; these are included in the totals higher up in the chart. The 'Inoperable aircraft' line shows the number of each type of aircraft that needed repairs to be flyable. Finally, DBA, for which information available was less detailed, is shown on a separate column, with the total number of inoperable aircraft shown as both a number and a percentage in the lower right corner.[332]

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[332] Efimov, '1941 god', (Pan'kin, ed., *1941*), pp. 6-22), pp. 10-11.

Table 1: **Aircraft on June 21, 1941 by Military District**[333]

Military District	*Bomber*	*CAS*	*Fighter*	*Recon*	DBA in Western USSR	*Totals: Western MDs (With DBA)*
Leningrad (LVO)	308	74	857	31		1,270
Baltic (PribVO)	425	93	621	72		1,211
Western (ZOVO)	695	70	870	154		1,789
Kiev (KOVO)	516	80	1,238	79		1,913
Odessa (OdVO)	268	0	640	42		950
Total	**2,212**	**317**	**4,226**	**378**	**1339**	**7,133 (8,472)**
Type as % of aircraft in Western MDs, excluding DBA	31	4.5	59.2	5.3	n/a	100
(% including DBA)	(26.1)	(3.7)	(49.9)	(45)	(15.8)	
New-model aircraft	360	18	1022	48	* See below	1448
Inoperable aircraft	**273**	**26**	**562**	**58**	**171**	**919 (1,090)**
Inoperable as %	12.3	8.2	13.2	15.3	12.8	12.9 (12.9)

* Of these 1,339 aircraft, 60% (803) were DB-3F, an extensively upgraded DB-3 which entered production in 1936. Minute numbers of Er-2 (a further extensive upgrade of the DB-3F) and TB-7 (a four-engine heavy bomber also known as the Pe-8) bombers had begun to enter DBA service.[334]
Also note that V. T. Iminov gives figures totalling 8030 aircraft in the Western Military Districts of the USSR on June 22, 1941. There is no apparent means of reconciling the disparity between the two.[335]

The Soviet repair and maintenance system was being upgraded in 1941, with increases in the number of units, their personnel, and the equipment available, as well as retraining so that the mechanics were familiar with the requirements of the newer aircraft which were beginning to come online.[336] Nonetheless, the maintenance situation was not all that bad. At first blush, a 12.9% inoperability rate looks terrible. However, the RAF expected to have a 25% peacetime inoperability rate in its squadrons in the same era, and that rate did not count aircraft sent out of the squadron for major repairs and maintenance.

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[333] Efimov, '1941 god', (Pan'kin, ed., *1941*), pp. 6-22), pp. 10-11.
[334] V. T. Iminov, ed., *Nachal'nii period Velikoi otechestvennoi voini. Vivodi i uroki*, (Moscow: Voroshilov Academy, 1989), p. 62; G. S. Biushgens, ed., *Samoletostroenie v SSSR 1917 – 1945 gg, kniga II*, (Moscow: TsAGI, 1994), pp. 61-69.
[335] Iminov, ed., *Nachal'nii period*, Appendix 6.
[336] V. M. Shishkin, 'Organizatsiia tekhniko-ekspluatatsionnoi sluzhbi i remonta v VVS Krasnoi armii pered nachalom voini (ianvar' – 22 iiunia 1941 g.) i v pervie mesiatsi voini (iiun' - sentiabr' 1941 g.).', (Pan'kin, ed., *1941*), pp. 66 – 76).

The USAF transport fleet expects readiness rates of 75% to 85% in the year 2000. Thus the Soviet Air Force's reported 87.5% readiness rate is, in fact, excellent.[337]

It is not clear from the data how much repair these inoperable aircraft required. It is possible, on the one hand, that a significant number required only minor maintenance and were reported as inoperable by units in order to gain better access to scarce maintenance materials. Yet, on the other hand, it is equally possible that the units chose to report only the worst cases, in order to present a better picture to their higher brass. The latter is more likely in light of the fact that the readiness rate is quite high, unless the Soviets were quietly increasing their readiness rate in light of the looming threat of war with Germany.

Another source of trouble was the question of aircrew training. The deficit of pilots had caused the Soviets to shorten the pilot training course repeatedly, down to the wartime level of 90 days in October 1940. On the one hand, this permitted an output of 9,613 pilots and 11,981 mechanics in 1940. On the other hand, the level of training of these pilots was not especially good. Most pilots in DBA were capable of operations in daylight in good weather. Just under a quarter could operate in daylight and bad weather, 11.8% could handle clear nighttime flight, and only 2.5% were trained for flying in bad weather at night.[338] The state of training of crews in the western military districts is shown in Table 3.

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[337] Correspondence with Erik Lund, 8 December 2000, citing E. A. Harrop, 'Planned Flying and Planned Aircraft Servicing in the Royal Air Force and the Effects of Aircraft Design on Maintenance,' (*Journal of the Royal Aeronautical Society* 52 (1949), pp. 667-730), 669, 720; Michael Yared provided a modern comparison: see John A Tirpak, 'A Clamor for Airlift', (*Air Force Magazine*, Volume 83, No. 12, December 2000, http://www.afa.org/magazine/Dec2000/1200airlift.html):

> 'In August, the spokesman reported, mission capable rates for the KC-135 were running at 86 percent, vs. a 'desired' level of 85 percent.'
>
> 'There is no question, however, that the chief culprit behind the airlift shortfall is the C-5 Galaxy, which in August turned in a mission capable rate of 63.3 percent vs. a requirement of 75 percent. Broken C-5s consistently gum up the train of worldwide AMC aircraft movements which take place 24 hours a day, AMC officials reported.'

[338] Iu. V. Simakhin, 'Podgotovka aviationnikh kadrov i sostoianie ukomplektovannosti aviatsionnikh soedinenii i chastei lichnim sostavom k nachalu Velikoi otechestvennoi voini', (Pan'kin, ed., *1941*), pp. 86-92), pp. 88-90.

Table 2: **Crew Training in Western Military Districts on the Eve of War**[339]

This table does not include DBA crews

Crews Trained For	*Leningrad*	*Baltic*	*Western*	*Kiev*	*Odessa*	*Total*
Day/Good Weather	1,135	787	1,289	1,547	699	5,457
As a % of crews	91	82	96	92	99	92%
Trained In New a/c	0	0	64	100	44	208
Day/Bad Weather	323	154	285	508	21	1,062
As a % of crews	21	16	21	30	3	17.9%
Trained In New a/c	0	0	4	0	0	4
Night/Good Weather	314	126	242	359	39	1,080
As a % of crews	25.1	13.2	18.0	21.3	5.6	18.2%
Trained In New a/c	0	0	4	0	0	4
Night/Bad Weather	27	0	17	0	0	44
As a % of crews	2.2	0	1.3	0	0	.7%
Trained In New a/c	0	0	0	0	0	0

This left around 480 crews who were insufficiently trained for combat under any conditions. Moreover, conversion training (normally conducted at the regiment level) to newer aircraft models was far from complete. Most crews for these aircraft had done no more than fly them around the airfield, leaving 1238 of the new aircraft without combat-effective crews. Training was usually cautious for fear of accidents, and also infrequent due to limits on available fuel. While the Far Eastern Military District managed to do over 100 hours of training per pilot in 1940, the Transcaucasus Military District, in second place, managed 70, and in many of the internal military districts pilots flew only 30 to 40 hours. Since tow planes could not fly faster than 250kph, no aircrew could practice firing at fast-moving targets.[340] As can be seen in table 2, crews were trained in any numbers for combat only in good weather (v prostikh usloviiakh) in the daytime. While this seems terrible, and Soviet commentators at the time took it to be, night and all-weather flying capability was a Grail much sought but rarely attained among all air forces of the era. Moreover, despite their apparent lack of training, Soviet aircrew in 1941 flew

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[339] Efimov, '1941 god',(Pan'kin, ed., *1941*), pp. 6-22), pp. 10-11.

[340] Iu. V. Simakhin, 'Podgotovka aviationnikh kadrov',(Pan'kin, ed., *1941*), pp. 86-92), pp. 88-90; F. B. Komal, 'Voennie kadri nakanunye voiny', (*VIZh*, 1, 1990, pp. 21-28), p. 26; Ia. A. Smushkevich, p. 45-46 in V. A. Zolotareva, et al., *Nakanune voini: Materiali soveshchaniia vishchego rukovodiashchego sostava RKKA 23-31 dekabria 1940 g.. Russkii arkhiv: Velikaia Otechestvennaia, T. 12(1).* (Terra: Moscow, 1993.)

bombing missions in weather which grounded the Luftwaffe - an observation lent credence by the fact that it comes from openly impressed Luftwaffe observers, who called Soviet aircrew training 'surprisingly high' in this respect.[341] While this might suggest that Soviet training standards were set much higher than the Luftwaffe's, wartime results suggest that this is not the case, as Soviet aircrew proved less well-trained than those of the Luftwaffe in virtually every other respect at the outset of the war. It is likely, instead, that Soviet Air Force commanders were simply more ruthless in attempting to conduct missions in dangerous weather. Moreover, they may have found that losses from the weather were outweighed by the reduction of losses due to the absence of opposition from grounded Luftwaffe fighters.

The training picture is further clouded by the arrival of 1177 aircrew, fresh from flight training, into the western military districts on June 1, 1941. This meant that 19.8%, or one in five, of the aircrew in these districts were new to their units, and had passed through only a very rapid training program.[342] Persistent troubles with training were one of the key reasons the Soviet Air Force suffered heavily in 1941. True, some German aircraft outclassed older Soviet aircraft, but disparities between pilot skills can far more important than disparities between airframes. In this regard, it is of interest that Mark Hanna concluded after flying both aircraft in the 1990s that the I-16 was a better fighter than the Hurricane, a star of the Battle of Britain.[343] However, disparities in airframes and crew training were not the only sources of trouble for the Soviet Air Force.

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[341] Walter Schwabedissen, *The Russian Air Force in the Eyes of German Commanders*, (New York: USAF Historical Division and Arno Press, 1960), pp. 119-120.

[342] P. I. Belonozhko, 'Operativo-strategicheskoe razvertivanie, sozdanie gruppirovki Sovetskikh VVS v zapadnikh prigranichnikh voennikh okrugakh v pervoi polovine 1941 goda. Organizatsiia upravleniia i vzaimodeistviia s sukhoputnimi voiskami.', (Pan'kin, ed., *1941*), pp. 42- 50), p. 44.

[343] Christer Bergstrom, Andrey Mikhailov, *Black Cross, Red Star: Air War Over the Eastern Front, Volume 1: Operational Barbarossa, 1941*, (Pacifica: Pacifica Military History, 2000), p. 13; Mark Hanna, 'Flying the Rata', (http://www.nzfpm.co.nz/articles/ratacwd3.htm, originally in Volume 5, #2, 1998 of *Classic Wings Downunder*.) Mark Hanna's commentary:

> 'I had just flown a Hurricane for the first time, a week before the Rata [I-16] and sorry to Hurricane aficionados, but I was really surprised and disappointed in the aeroplane's handling and

One of Barbarossa's enduring images is the Luftwaffe's fighters and bombers swooping down on overcrowded Soviet airfields, where aircraft lay parked wingtip to wingtip, inviting destruction and receiving it. The image is essentially accurate: the Luftwaffe struck 66 airbases on the first day of the war, which held around 5,000 aircraft (~70% of the aircraft in the western Soviet Union), and destroyed over 800 of them on the ground. The Soviet Air Force was unprepared for the strike, and paid a heavy price for this. Why, however, was it unprepared? The full answer to that question is still unclear, but an examination of Soviet basing and airbase construction does suggest parts of an answer.

As mentioned above, the Soviets had 7,133 aircraft in the western military districts at the outbreak of the war. At the beginning of 1941, the Soviets had some 454 airfields in the western military districts. In principle, each one could handle around 30 aircraft (and thus each 63-aircraft regiment needed 3 airbases). In theory, there were enough airbases for the aircraft. In practice, however, the Soviets felt they were 592 bases short at the beginning of May 1941. At that point, they had already built 160 airbases in 1941, bringing the total to 559, and planned to build another 490. During June, engineers completed another 52 airbases, bringing the total at the outbreak of war to 614.[344]

During the first half of 1941, aircraft had been arriving in these districts at an average overall rate of about 150 a month, with 400 arriving in March, for a total of 1,013

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performance (although very interesting and lovely to fly the type). I felt that you would be better off fighting in a Rata. At any rate I felt quickly far more comfortable in it. In air combat against early low powered 109's, I would suspect that the two aircraft were very comparable. Later variants of the Messerschmitt would easily be able to dictate the fight against the Rata due to the 109's superior speed and vertical performance. Considering the Rata was in full squadron service by 1936 and was the first heavily armed, retractable gear, monoplane fighter in the world, it has many merits and surprisingly few vices.'

[344] Efimov, '1941 god', (Pan'kin, ed., *1941*), pp. 6-22), pp. 10-12; A. I. Kondioglo, 'Til Sovetskikh VVS v predvoennii period. Organizatsiia tilovogo obespecheniia v pervie mesiatsi Velikoi otechestvennoi voini (22 iiunia – sentriabr' 1941 g.)',(Pan'kin, ed., *1941*), pp. 77-85), pp. 80 - 81; V. T. Iminov, ed., *Nachal'nii period*, p. 59; N. M. Ramanichev, *Krasnaia armiia 1940-1941: mifi i deistvitel'nosti*, (Excerpt of unpublished typescript (pp. 106-124)), pp. 119-120.

aircraft in six months. Given the rate of construction, this should not have overloaded the available airbases. However, it is probable that a significant portion of these aircraft went to the Kiev Special Military District, which was also undergoing the greatest expansion in airbases (its planned construction of 329 bases represents about half of planned construction in the western military districts). Furthermore, at the outbreak of war, 382 airbases were available, but not in use. Over 40% of air regiments in the western Soviet Union were based two to an airfield, causing aircraft densities of over 150 aircraft in some cases. This suggests that either some of the airbases on the list were not, in fact, operable, or that Soviet command systems were not up to the job of handling greater dispersal. Indeed, both may be true. False reporting was hardly beyond the realm of possibility in the Soviet system.[345]

The weakness of the Soviet signals system was also source of concern to the Soviets, and is bound up closely with the trouble the Soviets had in making the VVS an effective military instrument. While the VVS acquired its own signals arm in 1936, the levels of equipment this possessed in 1941 were in no way up to the levels intended or required. Communications between its 103 communications centers was all done on civilian telephone and telegraph lines, and provided neither the means of communicating between different air units, nor to the commands of Fronts and military districts. Funding, in 1941, was only at 20% of the level needed to bring the communications system up to specifications. As a result, most airbases did not have internal wire communications, let alone external. Problems were worst in the newly acquired territories in the western Soviet Union, where the civilian communications net was weak. Along the western border, fighter units were not tied into the early warning system.[346]

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[345] Efimov, '1941 god', (Pan'kin, ed., *1941*), pp. 10-11; Ramanichev, *Krasnaia armiia*, p. 120.
[346] G. V. Ul'ianov, 'Organizatsiia sviazi i radiotekhnicheskogo obespecheniia boevikh deistvii aviatsionnikh soedinenii i chastei v predvoennii period (ianvar – 21 iiunia 1941 g.) i v pervie mesiatsi Velikoi otechestvennoi voini (22 iiunia – sentiabr' 1941 g.)', (Pan'kin, ed., *1941*), pp. 93 – 104), pp. 93-94.

In theory, the problems with wire communications were less of a concern than they might have been, because the Air Force was officially moving to radio communications in any event. However, the VVS was responsible for putting radios into airplanes, while the Red Army Main Signals Directorate was responsible for providing ground radios. Neither was able to provide radios in the quantities needed, leaving units at 30% to 50% of their intended levels of equipmente. Even those intended levels were modest, since not every aircraft was expected to carry a radio, and most radios were receive-only. Commanders' inexperience with and distrust of radios complicated this picture, especially with regard to directing aircraft onto targets. Furthermore, there was a serious shortage of trained signals operators. It is probably for this reason that 382 airbases in the western Soviet Union were not in use, despite the overcrowding of aircraft at other bases. The means to communicate with those bases did not exist, and thus aircraft at them would have been useless.[347]

The Soviet command was well aware of the problems. A report by G. K. Zhukov, written on 1 April 1941, noted that VVS signals in the western military districts were disastrous. In addition to equipment problems, there was no unified system or method for signals, staff spent training time doing farm work, and most signals staff had little knowledge or understanding of signals organization and security. Zhukov noted, 'the breakdown of combat readiness of signals in the troops of the VVS in peacetime will lead to the paralysis of command in wartime.'[348]

A third source of over-concentration was doctrinal. The doctrinal troubles were partly a response to signals difficulties. As discussed earlier, in the aftermath of the Winter War, the Soviets attempted to improve coordination between ground and air units

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[347] Ramanichev, *Krasnaia armiia*, p. 120.

[348] G. V. Ul'ianov, 'Organizatsiia sviazi i radiotekhnicheskogo obespecheniia boevikh deistvii aviatsionnikh soedinenii i chastei v predvoennii period (ianvar – 21 iiunia 1941 g.) i v pervie mesiatsi Velikoi otechestvennoi voini (22 iiunia – sentiabr' 1941 g.)', (Pan'kin, ed., *1941*), pp. 93-104), pp. 94-101 (Zhukov quote from p. 101); Ramanichev, *Krasnaia armiia*, p. 121.

by decentralizing control air units away from Fronts, to Armies. While this made it easier for a given unit to coordinate activity with its supported Army, it left units with a smaller pool of signals equipment to draw on (Army instead of Front) and made command and coordination between air units in different armies more difficult. Furthermore, air units needed to try to find airbases to which their Army could provide signals support, a smaller area than that in which a Front could theoretically provide signals support. Thus, the doctrinal decision to concentrate air units at the Army level combined with severe shortages in communications equipment to create overcrowded airbases as an unintended result.[349]

The other half of the doctrinal problem, however, comes from an incorrect assessment of the effectiveness of strikes on airbases. As discussed in the previous chapter, some of the top Soviet Air Force commanders did not believe that strikes on airbases were especially effective. Thus, while the Soviets intended to construct a great many airbases, it is possible that many Soviet commanders did not expect the overcrowding to be as severe a liability in the event of war as it turned out to be. Nonetheless, this can be overstated, as the Soviet commanders who thought strikes on airbases were ineffective explicitly stated that this was under conditions of defended airbases with aircraft that were both dispersed and camouflaged. None of these three conditions pertained to Soviet airbases on June 22, 1941, and Zhukov's last-minute order to camouflage and disperse aircraft suggests compellingly that the Soviet command knew this was the case.[350]

The Soviets were caught in a bind: if they dispersed their aircraft to more airfields for better security, the deficit of signals equipment meant they would lose control of the

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[349] Iminov, ed., *Nachal'nii period*, p. 61; Ramanichev, *Krasnaia armiia*, p. 107, 121; Ul'ianov, 'Organizatsiia sviazi', (Pan'kin, ed., *1941*), pp. 93 – 104), p. 94.

[350] V. R. Zhuravlev, A. S. Anufriev, N. M. Emelyanova, 'Pervie dni voini v dokumentakh`, *VIZh*, 5, 1989, p. 43.

aircraft and thus the aircraft would become ineffective. If they did not disperse the aircraft, they risked having them more easily destroyed in the event of war. Vulnerability due to concentration on fewer airfields to ease communications could be offset by dispersal, camouflage, and defence at each airbase, but the Soviets did not accomplish these tasks. Thus their failure to provide adequate signals support drove them to a dangerous solution, and local units did not follow through on measures to protect themselves: a gap between what they knew ought to be done, and what they were actually doing, such as Smushkevich had already noted in regard to the Finnish War.

Signals turned out to be one of the major weaknesses of the entire Soviet military machine in Barbarossa. The under-allocation of funds to signals, and the existence of major deficits of signals equipment throughout the Soviet armed forces at the time, suggests that either the Soviets did not fully appreciate the importance of signals in warfare, or did not have the industrial capacity to produce signals equipment at the rate required by their military expansion in the later 1930s and early 1940s, or both. Since the Soviet government controlled industrial expansion, it is probable that the Soviet government as a whole under-rated the importance of signals. The Soviet people paid a high price for this error.

Thus, the primary cause of the over-concentration of the Soviet Air Force does not appear to be Air Force doctrine. That doctrine had a role, to be sure, but the relevant sections of it were being created in reaction to the shortage of signals equipment and operators. However, the Air Force is not free of blame in the wider picture of the Soviet neglect of signals. As discussed earlier, Soviet Air Force manuals and commanders, by and large, did not pay sufficient attention to signals. While the Air Force hoped to improve its signals through radio, it is unclear if the planned use of radio was as extensive as was truly required: two way radios in every aircraft, linked into a network of command

radios on the ground both at headquarters, airfields, and the front line. Even if the intended adoption of radio represented a change of heart, the Air Force wound up paying the price for its earlier cavalier treatment of signals.

Compounding the problem of signals were problems in training. This pertains not only to the problems with insufficient or untrained signals operators, but everywhere else in the Air Force as well. Commanders were hastily trained and hastily promoted to fill gaps in the ranks created by rapid expansion and purges. The rapid expansion caused the Soviets to curtail their crew training programs while the number of schools rose dramatically. Many of the aircrew were poorly trained, a matter made worse as new and unfamiliar aircraft appeared, and events would show they were not prepared for combat. An NKO directive in the winter of 1940-41 summarized training efforts by noting, '…the Red Army's air force's combat training was unsatisfactory. The flying-technical staff has poorly utilized new equipment.'[351]

The initial clash between the Luftwaffe and the Soviet Air Force is usually presented as one between a battle-tested force and one not used to combat. This picture is partly false. While the Luftwaffe was indeed battle-tested, the Soviet Air Force had seen some combat in the previous 5 years as well, in Spain, China, Mongolia, and Finland. The difference appears to be that the Luftwaffe learned from its experience, whereas the Soviet Air Force repeatedly failed to do so. In addition, the Luftwaffe had undergone a series of full scale trials by 1941, while the only war to put any significant part of the Soviet Air Force at full stretch was the Finnish War.

Thus the Soviet Air Force found itself facing a number of problems each of which was caused or compounded by another. Its aircraft were over-concentrated because of doctrinal considerations predicated on a deficit of signals equipment and operators that stemmed from a general Soviet neglect of signals. This was compounded by a generally

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[351] Ramanichev, *Krasnaia armiia*, p. 118, citing TsAMO, fond 35, opis' 11304, delo 13, list 48.

low level of training for aircrew, which was in turn exacerbated by the arrival of new equipment. The problems with signals, and, in part, the low level of training, stemmed from the Soviet's failure to learn effectively from their experience in past wars. As a result, tactics continued to be out of date, signals continued to be under-rated, and the full danger of over-concentration on airfields improperly understood. The bright point in this picture was that, despite their repeated failures to codify the correct lessons learned into doctrine, the Soviets had a demonstrated ability to learn under fire: an expensive training tool, but better than none at all.

Furthermore, the Soviet decision to subordinate most of their air units to Armies meant that they had, in essence, given up the ability to concentrate airpower. Since Fronts retained little in the way of assets, and the High Command retained control of heavy bomber aviation, the bulk of the power of the Soviet Air Force was incapable of shifting from Army to Army, let alone Front to Front. Battle-fighting is tactics, while operations is the art of orchestrating battles to achieve a goal - orchestration achieved not least through the ability to concentrate force where it is most needed in order to win those battles critical for the overall plan. Since 1918, Soviet theorists had argued it was necessary to mass airpower on the main axis for decisive effect, and doctrine similarly directed that airpower be used in mass. Thus, the failure of signals induced a failure of operational doctrine, nearly causing the operational air effort to cease to exist because it prevented the Soviets from being able to mass their forces where they were needed. This defect was remedied in 1942 after severe losses.

Early on 22 June, the Luftwaffe launched a carefully planned and coordinated attack that struck both Soviet airfields and communications. The telegraph wire net, which carried Soviet civilian and military communications, was specifically targeted and

brought down, causing widespread disruption. The Soviets claim to have run periodic alerts at their airbases, with most units able to scramble air units with the specified time limits: 25 to 30 minutes for fighters, 30 to 60 minutes for close support aircraft, and 90 minutes for bombers. However, the Soviet signals network was weak in peacetime, and the Luftwaffe's systematic bombing can hardly have improved the propagation of alerts to bases, thus compounding the Luftwaffe's advantage of surprise. The exception to this rule was the Odessa Military District, which had practiced dispersing its aircraft on alert to alternate airfields, and whose warning order to do so, issued at 23.00 on 21 June, appears to have succeeded in part – though the lower losses in the Odessa Military District may stem just as much from its location off of the primary axes of attack in the initial days of the war. Other Military Districts also sent out this order, but, not having practiced the dispersal, it was unrealistic to expect that the order would be carried out, especially at night.[352]

The Luftwaffe struck 66 airbases on June 22, which contained around 70% of the Soviet Air Force's aircraft in the west. Soviet losses on day one are reported as 1339 aircraft, with over 800 of these on the ground. Official loss statistics for the period 22 June through 30 October 1941 are:

Table 3: **Official Losses**[353]

Date	Cumulative Losses	Daily Loss Rate	Average Weekly Loss Rate
23 June	1,339	1339	9373
1 July	2,046	88	619
22 July	5,098	145	1017
21 August	6,442	45	314
22 October	7,746	21	147

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[352] B. B. Lariokhin, I. A. Tret'iak, 'Sovershenstvovaniia radiosviazi radiolokatsionnogo obespecheniia boevikh deistvii aviatsii', *VIZh*, 9, 1986, p. 68; I. T. Peresipkin, 'Voiska sviazi v period Velikoi Otechestvennoi voini', *VIZh*, 4, 1968, p. 36; Peresipkin, *Sviaz' v Velikoi Otechestvennoi voini*, p. 29-31, 76; I. T. Peresipkin, 'Sviaz' Generalnogo shtaba', *VIZh*, 4, 1971, p. 20; Khor'kov, A. G., *Boevaia i mobilizatsionnaia gotovnost' prigranichnikh voennikh okrugov nakanune Velikoi otechestvennoi voini*, (Akademiia General'nogo Shtaba, Moscow, 19XX [smudged]), pp. 19, 27, 81; Efimov, '1941 god', (Pan'kin, ed., *1941*, pp. 6-22), p. 13-14.

[353] Efimov, '1941', (Pan'kin, ed., *1941*, pp. 6-22), p. 10-11, 19.

30 October	8,166	53	368
Average	n/a	63	440

These do not necessarily tally the claim of 3655 aircraft left in the Western Soviet Union on 1 July, and 2216 left on 1 August, which would require 3478 losses by 1 July instead of 2046, and 4917 losses by 1 August, which is fewer than the above chart claims were lost by 22 July. Considering that the Soviets were also reinforcing the western units with aircraft from the interior and eastern military districts, and also sent 4517 aircraft from factories, the losses above are probably under-reported and may well have exceeded 10,000. Nonetheless, they paint a grim picture: by the end of October, after four months, the Soviets had lost more aircraft than there had been in the Western Soviet Union and DBA at the outbreak of the war. Indeed, by one claim the Soviets lost nearly half their aircraft in the West in the first week. The loss rate declined after that point, probably because combat had winnowed out the poorer Soviet pilots and ensured there were fewer planes available to lose, because the Soviets began to regain control of their own forces and thus were better placed to engage on their own terms, and because the Luftwaffe was suffering from its own mounting problems due to losses, maintenance, and logistics.[354]

The Soviet rate of loss was, in most respects, disastrous: nearly 100% in four months. On the other hand, this rate of loss – effectively 300% per year – is apparently the loss rate the Soviets *expected* to sustain! Calculations based on the Spanish Civil War suggested that the yearly loss rate of aircraft in a major war would be 300-400% of aircraft engaged. Expected or not, the loss rate was one the Soviets were ill-prepared to handle. Rapid retreats forced the relocation of factories and training centers. Moreover, the losses at the front line prompted the Soviets to make an error the Germans would later commit as well: sending flight instructors into the front line. While this succeeded in

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[354] Efimov, '1941', (Pan'kin, ed., *1941*, pp. 6-22), p. 10-16; Murray, Luftwaffe, pp. 81-107.

providing a short-term boost in the number of experienced pilots in the front lines, the long-term consequence was a reduction in the overall quality of pilot training. The apparent level of Soviet desperation suggests that if the 300%-400% loss rate was known, they had not fully understood what it would mean, and the Soviet war machine was in any event not fully up to the task of coping with it.[355]

Perhaps the Soviets had expected that the loss rate would apply to both sides. In this respect, they were not so far off the mark. The Luftwaffe sustained significant losses at the hands of the Soviets, suggesting that, for all the Soviet Air Force's failings, it nonetheless continued to provide noteworthy opposition. Out of an average strength of 2462 aircraft on the Eastern Front, the Luftwaffe lost an average of 741 planes per month from June 22 through 1 November 1941, for an average monthly loss rate of 30% and a yearly rate of 360%. This also amounted to a weekly loss rate of about 174, against the VVS weekly loss rate of about 440 for the same period. By 30 June, the Luftwaffe had lost 699 aircraft on the Eastern Front and had only 960 still operational there. By 27 September, the Luftwaffe had lost 1603 aircraft destroyed (and another 1028 damaged) on the Eastern Front in three months. By contrast, the Luftwaffe lost 1385 aircraft in the Battle of Britain in three months. However, unlike the Battle of Britain, the battle for aerial supremacy on the Eastern Front continued, unrelenting.[356] Williamson Murray concluded, regarding the air war over the Eastern Front in 1941,

> For the second year in a row, the Luftwaffe had lost nearly its entire complement of aircraft. The German air force could not look forward, as it had in 1940 after the Battle of Britain, to a period of recuperation. The failure in front of Moscow meant that the war in the east would continue with its ever-vaster commitments and its interminable distances.[357]

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[355] Khor'kov, *Boevaia i mobilizatsionnaia gotovnost'*, p. 49; A. S. Goriainov, 'Razvitie VUZov i podgotovka kadrov dlia VVS v nachale Velikoi otechestvennoi voini', (Pan'kin, ed., *1941*, pp. 112-116), pp. 114-115.

[356] Williamson Murray, *The Luftwaffe, 1933-45: Strategy for Defeat*, (London: Brassey's, 1996), pp. 96-107; Bergstrom, Mikhailov, *Black Cross/Red Star*, pp. 72, 192.

[357] Murray, *Luftwaffe*, pp. 103-104.

While pre-war theory and doctrine pointed towards the use of strikes on enemy airbases as well as air combat in order to gain superiority over the enemy, the primary means the Soviets used to combat the Luftwaffe in World War 2 was aerial combat. They did not come to this conclusion immediately. On 22 June 1941, the Soviet Air Force was ordered to bomb the Luftwaffe's airbases, debate on the value of such strikes notwithstanding. However, bombers units attempting this mission were, at best, poorly coordinated with fighter escorts, and often completely unescorted; and the sad fate of these large formations of bombers is well known. As a result, subsequent airbase attacks were generally not attempted in 1941. From 22 June to 30 September, the Soviet Western Front launched only 1,987 sorties on airbase attacks, just over 4% of the 50,000 or so sorties it launched in that time frame, while some 37% of all sorties by the Soviet Air Force up to 30 September were fighters on air superiority missions. The next major attempts to bomb German airbases did not occur until the fighting outside Moscow, when major efforts were made on 11-18 October and 5-7 November. These generated some success, but are noteworthy in part because they exist at all. Moreover, faced with high losses and the Luftwaffe's dominance in the air, the Soviets switched, by the end of June 1941, to a policy of engaging in aerial combat only in favorable circumstances. The one shift from this policy during the summer of 1941 came at Smolensk, when the Soviets committed numerous flight instructors in the hopes of turning around the air war. Luftwaffe losses increased, and Luftwaffe monthly losses in 1941 peaked in July, with 16.1% of aircraft in the East lost. However, Soviet losses also increased, and the effort was not sustainable from the Soviet side. Furthermore, the loss of instructors cannot have had a positive impact on the Soviet's training program.[358] The shift to engaging the

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[358] Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), pp. 15-16; Murray, *Luftwaffe*, pp. 90-92; Goriainov, 'Razvitie VUZov', (Pan'kin, *1941*, pp. 112-116), pp. 114-115; I. V. Timokhovich, *Operativnoe iskusstvo Sovetskikh VVS v Velikoi Otechestvennoi voine,* (Moscow: Voenizdat, 1976), pp. 70-74; Bergstrom, Mikhailov, *Black Cross/Red Star*, pp. 84-85.

Luftwaffe only in conditions of tactical superiority is reminiscent of the concepts for the operations of a small air force the Soviets developed in the 1920s, but it is not clear if those concepts were explicitly explored in 1941, or rediscovered as a logical means of limiting losses.

Also important in reducing losses were measures taken to protect airbases better. Steady work to improve camouflage and dispersal helped in reducing losses from 1570 on airbases in June to 99 in July and 33 in August.[359]

At the end of June 1941, the Soviets shifted from focusing on both Luftwaffe airfields and ground support to focus wholly on ground support. As a result, some 47% of all sorties in the first three months of the war were for ground support. However, ground support was poorly organized. Soviet Air Force organization, with most units subordinate to armies, prevented the Soviets from massing on a decisive axis. High losses in bomber units ensured the Soviets would not have the aircraft to generate significant results without massing. By the end of September, the various Soviet Fronts each had between 17 and 120 bombers remaining, and 4 to 30 close-support aircraft each – almost all of them parceled out to subordinate armies. When combined with often-inexperienced commanders, signals still impaired by underfunding and enemy action, and requests from ground commanders who had little understanding of the capabilities and limitations of air power, the result was 'separate, episodic strikes', in which small groups of aircraft struck laundry lists of scattered targets, devoid of effective cooperation with supported units on the ground.[360] The structural inability to concentrate on targets enforced by the dispersal of air units to armies and high losses was compounded by an

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[359] Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), p. 14.
[360] Iminov, *Nachal'nii period*, pp. 126-127; Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), p. 17, quote on p. 17; P. I. Belonozhko, 'Operativo-strategicheskoe razvertivanie, sozdanie gruppirovki Sovetskikh VVS v zapadnikh prigranichnikh voennikh okrugakh v pervoi polovine 1941 goda. Organizatsiia upravleniia i vzaimodeistviia s sukhoputnimi voiskami.', (Pan'kin, *1941*, pp. 42- 50), pp. 45-49; Timokhovich, *Operativnoe iskusstvo*, pp. 217-222.

order issued by Stavka on 4 July 1941 intended to use smaller groups of aircraft in an attempt to reduce losses, reacting to the destruction of large Soviet bomber formations in the early days of the war:

> Flying to bomb targets and troops in large groups is categorically forbidden. Flying to a given target at the same time should not be done by more than a single zveno or in exceptional cases by a squadron.[361]

Long-Range Aviation (DBA) fared little better. Despite prestige raids on targets such as Berlin and the Ploesti oilfields, raids on strategic targets accounted for only 5% of its activity. More frequently, it was called hither and yon by a series of competing requests from Stavka, Fronts, and the Soviet Air Force high command, leading it to attempt to accomplish numerous tactical and operational support missions with insufficient planning and less focus of effort. This scattering of effort was somewhat curtailed after 4 July 1941, when the assignment of missions to DBA was reserved to the Chief of the General Staff, but the DBA had already suffered heavy losses. By 30 September 1941, it retained only 402 of its original 1,339 aircraft, and 171 of those were not fit to fly. Furthermore, as of 3 July 1941, Stavka ordered that all outdated bombers be used only at night, which preserved the bomber force at the cost of reducing its effectiveness.[362]

The Soviets were well aware of their problems, and conducted several efforts to reorganize their force structure in the summer of 1941. On 24 June 1941, the Soviets instituted the post of Commander in Chief of the VVS RKKA, placing all Soviet Air Force units under the control of this staff for strategic, independent, and separate operations, and for gaining air superiority. Unfortunately, this meant the almost none of the missions actually being conducted by the Soviet Air Force were under centralized command, because they fell into the category of direct support. This change also placed

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[361] Timokhovich, *Operativnoe iskusstvo*, pp. 218. A zveno had 3 aircraft, and a squadron 12.
[362] Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), p. 18-20; Timokhovich, *Operativnoe iskusstvo*, pp. 220-221.

all commanders of Frontal Aviation in direct subordination to the Commander in Chief of the Soviet Air Force, but left them also subordinate to their Front commanders, and moreover failed to subordinate the various army's air units to centralized command or to the Fronts commanding them. Similarly, the formation of the North-Western, Western, and South-Western Strategic Directions on 10 July 1941, intended to provide better operational control and centralization to both ground and air forces, was hindered by the fact that the bulk of Soviet aviation was controlled by armies.[363]

The Soviets were also experimenting with tactical organization. On 15 July 1941, they began forming mixed air regiments, with two bomber and one fighter squadron each, in an attempt to provide better coordination between bombers and escorts. The experiment did not prove itself, in part because of logistic difficulties, and on 20 August 1941 all regiments began to be formed out of one type of aircraft, with two squadrons per regiment. Of greater utility, the Soviets began forming Supreme High Command Reserve Air Groups (RAG VGK), of 80 to 160 aircraft (one or two bomber, one or two close support, and four to six fighter regiments each) on 21 July 1941. These were intended to be equipped only with newer aircraft and better-prepared pilots. As importantly, they were controlled by Stavka, and thus could be directed against the axis most in need of reinforcement, as when three of them were flung against Guderian's 2nd Panzer Group in late August and early September 1941 – though they were committed sequentially, not en masse. Nonetheless, the formation of these Reserve Groups was an important step away from the inflexible system with which the Soviets had begun the war, and towards the critical reforms of the spring of 1942. They began to restore to the Soviet command the ability to concentrate the Soviet Air Force where it was needed.[364]

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[363] Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), p. 19-20.
[364] Efimov, '1941 god', (Pan'kin, *1941*, pp. 6-22), p. 20, A. G. Pervov, 'Nekotorie voprosi sozdaniia i primeneniia aviatsionnikh rezervov glavnogo komandovaniia nakanune i v pervie mesiatsi Velikoi otechestvennoi voini', (Pan'kin, *1941*, pp. 131 – 139), pp. 136-138.

The Soviet Air Force's next attempt to take the war to the enemy occurred in October. The Soviets thought they had discerned a Luftwaffe plan to concentrate between 1,000 and 1,500 aircraft intended to launch a major attack on a variety of Soviet strategic and operational targets near Moscow on 12-13 October. In response, the Soviets launched as much of their forces as they could at Luftwaffe bases from 11-18 October. The impact of these strikes is uncertain; the Soviets claimed, at the time, to have destroyed an unlikely total of 500 German aircraft, while German accounts suggest the damage was relatively minor. A repeat attack on 5-8 November is claimed to have produced another 200 German aircraft losses. In all probability the damage was relatively slight, but the wider significance was not: the Soviet Air Force was beginning to return to the fray. While the Soviets had lost some 21,200 aircraft in 1941, of which between 10,000 and 15,000 were in combat, the majority of the losses took place early, and replacement machines continued to come. The Luftwaffe's records, in the same period of time, show a loss of 2,093 aircraft destroyed and another 1,734 damaged on the Eastern Front. However, the Luftwaffe received fewer replacements, and was further hampered by failure to adequately prepare for winter. The Soviets appear to have learned and applied their lessons from Finland in that regard. Furthermore, because the Luftwaffe's replacement abilities were far worse than the Soviet's, the Soviets were periodically able to claim numerical superiority even after their stupendous losses, and on occasion to threaten the Luftwaffe's air superiority, notably in the fighting for Moscow in late 1941 and early 1942.[365]

The Soviets were not entirely unhappy with the results of the air war waged in the winter of 1941-1942. A Northwestern Front report on the fighting in later 1941 and early

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[365] Timokhovich, *Operativnoe iskusstvo*, pp. 72-74; von Hardesty, *Red Phoenix: The Rise of Soviet Air Power, 1941 - 1945*, (Washington: Smithsonian Institution Press, 1982), pp. 72-74; Bergman, Mikhailov, *Red Cross/Black Star*, pp. 196-197, 252-255.

1942 noted a number of successes.[366] The report extolled the virtues of pair-based tactics (leader-wingman), such as the Germans had pioneered in Spain. It also declared categorically that 'A pilot without a radio is half-blind', and that 'As a rule, in those units which are better provided with radios there are greater successes and fewer losses.' Furthermore, the Northwestern Front reported that it had waged a successful battle for air superiority in covering an offensive, by launching a strike on Luftwaffe bases shortly prior to the ground offensive and then waging and aggressive campaign in the air: as they noted,[367]

> But, however successful the raids on airbases, they do not decide the question of mastery of the air, but only form the preconditions for it. Mastery of the air is won, in the end, through aerial combat.[368]

This fighter campaign was directed by forward control points, sited near the front lines and equipped with radios to connect them to both the fighter bases and the fighters in the air, allowing the Soviets to vector fighters where they were needed. Moreover, all pilots were rotated through the forward control points to ensure that all pilots were familiar with their abilities and limitations. The Northwestern Front was pleased with its successes, limited and tactical though they were, and overall the report strongly suggests that the Soviets were busily demonstrating their ability to learn under fire.[369]

A Soviet Army report on the winter offensives in 1941-1942 paints the Air Force in a different light and makes it clear that, despite its improvement, the Air Force still had a long way to go. Examining the use of combat aviation, it noted that, 'Combat aviation is often scattered. Instances of massed use of aviation for systematic impact on the

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[366] Note that these reports, while published in later 1942, were prepared by the relevant Fronts at a somewhat earlier date. The *Sbornik* publications followed a general order to the entire Soviet military to prepare after-action analyses of their combat activity, and the first two issues of the *Sborniki* used material already available from those formations that were already preparing reports.

[367] 'Bor'ba za gospodstvo v vozdukhe na severo-zapadnom fronte', (*Sbornik materialov po izucheniiu opita voini No. 2, Sentiabr' – Oktiabr' 1942 g.*, (Voenizdat, 1942), pp. 98-102), pp. 99-100.

[368] 'Bor'ba za gospodstvo v vozdukhe na severo-zapadnom fronte', (*Sbornik materialov No. 2*, pp. 98-102), p. 101.

[369] 'Bor'ba za gospodstvo v vozdukhe na severo-zapadnom fronte', (*Sbornik materialov No. 2*, (Voenizdat, 1942), pp. 98-102), p. 100-102.

enemy on the main axis of his offensive are rare.' - another instance of the Soviet Air Force recognizing its failure to execute its own doctrine.[370] Further criticism was leveled against the Air Force for its inability to provide effective support to the parachute assault operations the Soviet conducted in that winter:

> The majority of desant operations were conducted in the complete absence of support from combat aviation. In the best case a quite limited force of aircraft, designated for support, was unable to complete the assigned mission. [...]
> Tactical coordination of aviation with landed desant forces was also absent. Aviation, as a rule, acted on indicated points thought to be occupied by enemy troops and fire points. Where the desant was at that moment, and if it was better to bomb the indicated point or some other, the aviation did not know.[371]

Thus, while the Air Force was improving its ability to contend with the Luftwaffe, it still faced grave difficulties in actually fulfilling its missions for the Army. Further in this vein, the report on offensive operations concluded that,

> Combat aviation should be centralized at the Front level. Dispersing aviation to armies is, in most cases, pointless. [...] Combat aviation is most effective when centralized at the Front level, with its strikes massed on the most important targets of the enemy offensive. When the enemy's communications are difficult, combat aviation can gain significant operational results by destroying important roads and denying the enemy regular resupply.[372]

This shows that the Soviets were figuring out that the attempt to centralize airpower through the use of Strategic Directions had failed, and neither was the use of VGK Reserve Air Corps able to tip the balance far enough in overcoming the problems the Soviets faced in structuring their Air Force to concentrate its power. Recognizing this, the Soviets prepared a complete overhaul of their organization, and brought in a new person to command the Air Force: Aleksandr Alksandrovich Novikov.

Novikov, whose military career began when called into the Red Army in 1919, graduated from the Frunze Academy in 1930, moved into the Air Force in 1932. He had

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[370] 'Operativno-takticheskie uroki zimnoi kampanii 1941/42 g.', (*Sbornik materialov No. 2*, (Voenizdat, 1942), pp. 3-10), p. 3.
[371] 'Nekotoriie vivodi po desantnim operastiiam za 1941 god', (*Sbornik materialov po izucheniiu opita voini No. 1, Iul' – Avgust 1942 g.*, (Voenizdat, 1942), pp. 9-18), p. 12.
[372] 'Operativno-takticheskie uroki zimnoi kampanii 1941/42 g.', (*Sbornik materialov No. 2*, (Voenizdat, 1942), pp. 3-10), pp. 7-8.

risen to be Chief of Staff of the Air Force for the North-Western Front (defending the Baltic states and Leningrad) by the time of the Finnish war, and took command of the Leningrad Military District Air Force in 1940. His successes in the defense of Leningrad, as both commander of Frontal Aviation there and as First Deputy of the Commander of the Air Force, led to his promotion to Commander of the Air Force on 11 April 1942. (In a sign of the improvement of relations between Stalin and his generals, Novikov's predecessor, Pavel Zhigarev, was not shot, but moved to command the aviation of the Far Eastern Military District.).[373]

Novikov's experience in the Finnish War and during 1941 convinved him of the necessity of reorganizing the Soviet Air Force to enable greater concentration of force. While still the First Deputy of the Commander of the Air Force, he attempted to form aviation corps of several divisions, each composed of one type of aircraft. Stalin was not impressed, but permitted Novikov to experiment with such a corps to assist in the attempt to break the blockade of Leningrad in early 1942 and attempts to destroy the Demiansk pocket. Opinions vary regarding Novikov's level of success, with some analysts calling the Soviet Air Force presence 'negligible', while others call the Luftwaffe's loss of 265 transport aircraft by the end of February 1942 as 'inordinately high' despite its overall success in preventing the fall of the pocket. Certainly the Soviet Air Force performance could have been better. Novikov tried a number of expedients in hopes of improving interception efficiency, including ordering IL-2 ground attack aircraft to intercept German transports. For these efforts, air force troops awarded him the punning rhyme 'Priekhal Novikov - zhdi novinki!' ('Novikov's arrived - await novelties!')[374]

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[373] P. Kutakhov, 'Glavnii marshal aviatsii A. A. Novikov', (*VIZh*, 11, 1970, pp. 61-65), pp. 61-62; John Erickson, 'Alexander Alexandrovich Novikov', (Harold Shukman, Ed., *Stalin's Generals*, pp. 154-174), pp. 157; 162-163.

[374] A. M. Khorobrikh, *Glavnii marshall aviatsii A. A. Novikov*, (Moscow: Voenizdat, 1989), pp. 88-90 ('await novelties' p. 90); Joel S. Hayward, *Stopped at Stalingrad*, (Lawrence: University of Kansas, 1998), pp. 235 ('negligible' quote on p. 235); Richard Muller, *The German Air War in Russia*, (Baltimore: The

This willingness to break with the past in pursuit of effectiveness stood Novikov in good stead when he rose to command of the Soviet Air Force. Novikov promptly began the process of replacing the old organization. In April 1942, ground armies lost nearly all of their aviation assets to Fronts, leaving only a regiment of reconnaissance and liaison aircraft to each army. Further, each Front's aviation was united into an air army. Each air army contained, in theory, eight fighter, four close support, two bomber, and one night bomber regiments in addition to training, reconnaissance, and liaison units. In practice, air army organization proved highly variable.[375] The Western Front was first to receive this treatment, in an order on 5 May 1942:

> In the interests of increasing the striking power of aviation and successful use of massed aviation strikes, unite the aviation forces of the Western Front into a single air army, to be designated '1st Air Army'.[376]

As companions to the air armies, Novikov formed further aviation armies as High Command Reserves. Initially, he intended to form at least three of these, two fighter and one bomber, with each aviation army to comprise some 200-300 aircraft in three to five divisions. However, only one of these, the 1st Fighter Aviation Army, was actually formed. In practice, the High Command Reserve Aviation Army turned out to be excessively large and insufficiently mobile, maneuverable, or flexible, especially when placed alongside the air army already existing in a Front command structure. The High Command Reserve aviation army was replaced by the High Command Reserve air corps, intended to be more mobile, maneuverable, and more easily integrated into the structure of a Front and its air army. The aviation armies in formation, along with the various High Command Reserve air groups already formed, were reformed into air corps along the same lines as the air corps of the air armies themselves. Each corps contained two or

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Nautical and Aviation Publishing Company, 1993), p. 63; Murray, *Luftwaffe*, pp. 118-119 ('inordinately high' quote p. 120).

[375] A. M. Khorobrikh, *A. A. Novikov*, p. 92; Erickson, 'Alexander Alexandrovich Novikov', (*Stalin's Generals*, pp. 154-174), pp. 163-164.

[376] A. M. Khorobrikh, *A. A. Novikov*, p. 92.

three divisions, with bomber corps having 200-300 aircraft while fighter and close support corps contained 250 - 375 aircraft. Initially, there were also mixed air corps, of two fighter divisions and one division of either bombers or close support aircraft, but this organization was phased out in 1944. However, the bulk of this organization proved itself: Novikov had rebuilt the Soviet Air Force structure such that it could finally attempt in practice what theory and doctrine had long recommended: massing on the decisive axis in support of the ground forces. Indeed, the importance Novikov assigned to this can be seen clearly in the fact that the High Command's aviation army and air corps were built up in preference to the air armies of various fronts even in the desperate summer of 1942. By the end of 1942, thirteen reserve air corps had been formed, comprising 1/3 of all Soviet tactical air power, and they were given preference in delivery of modern aircraft types. By the end of the war, the reserve air corps comprised 43% of all front-line combat aircraft. As a result of Novikov's reforms, each Front had a small air force to call its own and to concentrate as its situation demanded. Of equal importance, the reserve air corps gave the Soviets the ability to concentrate massed airpower in a temporary and flexible manner by reinforcing each Front's air army as needed.[377]

Alongside these changes to the organization of frontal aviation, Long-Range Bomber Aviation was also reorganized. The early war structure of separate corps under the command of Long-Range Bomber Aviation (DBA), used at the discretion of Stavka, was soon downsized into separate divisions due to massive losses. On 5 March 1942, these divisions were consolidated into the ADD (Long-Range Aviation, Aviatsii Dal'nego Deistviia). In theory, ADD was to act as an independent, concentrated strike force against operational and strategic targets, but in practice it was usually tasked in support of

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[377] A. M. Khorobrikh, *A. A. Novikov*, p. 92-96; Erickson, 'Alexander Alexandrovich Novikov', (*Stalin's Generals*, pp. 154-174), pp. 163-164; 'Aviationnii korpus', p. 36 in M. M. Kozlov, ed, *Velikaia otechestvennaia voina 1941 – 1945: entsiklopediia*, (Moscow: Sovetskaia entsiklopediia, 1985); Timokhovich, *Operativnoe iskusstvo*, pp. 313-314; 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 96-97.

ground operations, directly, albeit temporarily, subordinate to a Front despite being theoretically independent. Eventually, in December 1944, ADD was organized as the 18th Air Army (Long Range), directly subordinate to the Soviet Air Force as a reserve unit, to bring its place in the command structure into line with its mission.[378]

Putting these changes into place was not entirely smooth given the dire situation on the front in the summer of 1942. Particularly revealing in this regard is an analysis of air force operations, published in early 1943 as part of a general collection of analyses, but probably written and initially distributed in September or October of 1942. These documents were written by the analysts attached to every Soviet Front and Army from the spring if 1942 onwards, tasked with writing on the "use of war experience". Covering a wide range of topics, it noted that an Air Army would be overwhelmed when attempting to command the equivalent of 15 air divisions, which argued for the need to speed up the formation of permanently grouped air corps inside of air armies, similar to the air corps that already existed for the High Command Reserve. As a temporary measure, the report suggested forming operational groups out of sets of air divisions. On a wider scope, however, the report provides a good look at the state of Soviet thinking and effectiveness on the eve of Stalingrad.[379]

A central feature of the report is an analysis of a failed offensive, launched by the 16th and 61st Armies on 5-8 July 1942 near Bolkhov (southwest of Moscow). 500 aircraft were available at the outset of the operation, and the Soviets held air superiority for two days, delivering some 2400 sorties. This massive support assisted the 16th and 61st Armies in advancing 8 to 10 kilometers along parts of the 40 kilometer assault front. However, the Air Force's actions were limited to covering the battlefront and delivering close air support, while actions against the Luftwaffe and German reserves were absent.

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[378] Timokhovich, *Operativnoe iskusstvo*, pp. 315-316, von Hardesty, *Red Phoenix*, pp. 85-86.
[379] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 93, 96.

The Germans were soon able to reinforce the sector, while at the same time the Soviet Air Force was weakening through losses caused by enemy action and operational breakdowns. Therefore, Soviet sorties steadily declined while Luftwaffe sorties rose:

Table 4: **Bolkhov Operation Sortie Rates**

Day	Soviet sorties	Luftwaffe Sorties
July 5	1,411	39
July 6	1,000	380
July 7	561	748
July 8	448	850

Denied effective air support after the second day of the offensive, the 16th and 61st Armies were halted and driven back by German reserves. The anonymous Soviet analyst drew numerous conclusions from this experience, and the conclusions were well in line with both Novikov's predilections and pre-war Soviet theorizing.[380]

First off, the Soviets concluded that they had insufficient airpower to manage the task at hand. While the aircraft assembled had been able to assist the ground forces in moving forward, they had also been worn out by the third day, when the decisive battle for air superiority began, and they did not have enough strength to prevent the Luftwaffe from gaining superiority on the third day. To overcome the wear and tear of high-intensity operations (the Soviets lost 100 aircraft in the first day of the Bolkhov operation, mostly to mechanical failure) and to combat the inevitable rise in enemy air strength, the report recommended maintaining a significant reserve of aircraft and aircrew, especially in fighters.[381]

The study concluded that the main blow required a force of at least 600-800 aircraft, of which at least 40% should be fighters, unless enemy air opposition was exceptionally weak. Furthermore, many of the fighters needed to be held in reserve to ensure that fresh machines and pilots were ready to counter the enemy's reinforcements.

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[380] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 85, 90-92.
[381] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 85-86, 90-92, 101-102.

While the report declared that the most effective use of fighters was in 'wide-ranging active operations over enemy territory', the critical air superiority mission required the use of three mutually reinforcing methods: direct airbase attack, aerial blockade of airbases, and the destruction of enemy aircraft through air combat. The anonymous analyst concluded that the Bolkhov operation's use of only the third method contributed to its overall failure, as did the commitment of 2,065 sorties of 3,979 (flown from 5 through 10 July) to direct cover of the front line (defensive counter-air), as compared with 1,767 on ground attack, 78 on reconnaissance, and a mere 69 on airbase attack. After losing air superiority, the 1st Air Army planned and conducted a simultaneous strike on four airbases on 9 July, presumably accounting for all 69 of the airbase strike sorties. While deemed successful in weakening enemy opposition on 10 July, and destroying a claimed 120 enemy aircraft in comparison to a claimed 150 destroyed in the air over the previous 5 days, the strike was too late to materially affect the situation on the ground.[382]

From this, the Soviets concluded, quite in line with their pre-war inclinations, that the primary principle of aerial warfare was '*decisive massing on the axis of the main blow*': concentrated use of aviation, with massed strikes against enemy aviation and ground forces.[383]

> Insufficiencies of strength not only do not free commanders from the necessity of the massed use of aviation, but instead still further increase the demand for it; the less the strength, the more focused should be the use of aircraft for strikes on the most important targets.[384]

Massing, the report further notes, meant not necessarily a large number of physical aircraft being present, but producing the effect of,

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[382] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 91, 99-101 (quote p. 101).
[383] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 90, (quote from p. 90 (emphasis in original).)
[384] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 90-99.

> ...the relentless action of a large number of aircraft for an extended time with the goal of the suppression or destruction of important objects located in a relatively narrow section of the front.[385]

Equally, it fits well with pre-war Soviet attitudes to aerial warfare that, 'The actions of aviation always have the goal of providing combat assistance to the ground forces in an operation.'[386] As a result, while the massed initial strikes could be carried out either before or concurrently with the opening of the ground offensive, the latter option was distinctly preferable in order to maintain operational surprise, given a sufficient preponderance of aerial strength.[387]

Ensuring surprise was both important and difficult. While the aircraft could be flown on the evening prior to the offensive, constructing the necessary airfields and logistical supports necessitated extensive prior preparation. Basing some aircraft with a neighboring Front eased the pressure on the Front launching the offensive, and complicated the enemy's intelligence picture. Even so, the bare minimum number of airbases to handle the expected 600-800 aircraft would be in the teens, and for more comfortable basing, and adequate reserves of deception and alternate bases would drive the number well into the thirties or more. Construction of this many bases required weeks, and the report noted specifically that the rear area services would require at least 10 to 12 days to prepare. Concealing all of this from the enemy was accorded great importance, but no details of how this might be accomplished were suggested in the analysis beyond the need to provide plenty of dummy airfields.[388]

The Air Force was moderately pleased with its own performance, having gained air superiority for a time and contested it thereafter. Moreover, the new organization had

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[385] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), p. 91.
[386] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), p. 99.
[387] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 98, 101.
[388] 'Massirovanie voenno-vozdushnikh sil v operatsii', (*Sbornik materialov No. 4*, p. 84-101), pp. 94-97. Airbase calculation based on expected 600-800 aircraft and the report's recommendation of 30-50 aircraft per base; 600 aircraft at 50 per base fit on 12 bases. 800 at 30 per base fit on 27. The report recommends keeping at least 25% of the bases unoccupied at any one time and preferably more.

generally proven itself, enabling the Soviets to concentrate aircraft better than before and thus to focus the efforts of airpower where it was needed. However, other aspects of the practical application of airpower were not as successful, and the Army was not especially happy with the support provided. Its report on events in the Bolkhov operation concluded that air and artillery cooperation with ground forces had been quite poor. The massive strike on 6 July 1942 mostly missed its targets, and the 192nd Tank Brigade lost 6 tanks to friendly aircraft. In another example of the prevalent poor coordination, on 7 July a major airstrike was conducted at 0700 in support of an attack scheduled to occur at 1400. In view of the Army's complaint, echoed by the Air Force, that the concentration of force had been insufficient, both overall and in detail, it is clear that the Soviet Air Force's performance had plenty of room for improvement. The next major demonstration of their abilities came farther south, at Stalingrad.[389]

Operations in the south went poorly for the Soviets in the summer of 1942. Weakened by the failure of the Kharkov offensive in the spring and the high command's focus on defending Moscow, Soviet forces in the Ukraine crumbled and fell back under the German summer offensive, aimed at Stalingrad and the Caucasus oilfields. As in 1941, the Soviets worked to concentrate their airpower, though they met with mixed results. Low numbers of aircraft and the high tempo of operations lead to many of the Soviet aircraft being grounded for maintenance, sometimes reaching 60-70% of all aircraft: on 1 September 1942, the 8th Air Army had 193 fighters and 195 bomber/strike aircraft, but only 57 fighters and 69 bomber/strike aircraft were functional. Forces concentrated on one hotspot would provide useful support, but when they were reallocated to meet a larger threat, troubles returned at the location suddenly forsaken.

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[389] 'Nekotorie vivodi po operatsii levogo kryla zapadnogo fronta', (*Sbornik materialov po izucheniiu opita voini No. 5, Marta 1943 g.*, (Voenizdat, 1943), p. 60-75), pp. 62 & 67.

Since both sides tended to commit to the same hotspot, the Soviets tended to wind up in large aerial battles with the Germans, with consequent increased losses.[390]

Attempting to conserve their forces, the Soviets found several expedients successful. Bombers attacked from high altitude, without fighter escort, using speed and surprise to evade interception. The anonymous Soviet analysts did not comment on the effectiveness of the bombs thus delivered. Close support aircraft attacked from medium altitudes instead of low altitudes, trying to reduce losses to ground fire and enemy fighters. This, too, depended on surprise to evade interceptors, and in the process doubtless reduced the effectiveness of the support provided due to reduced accuracy of fire from medium altitudes instead of low altitudes. The Soviets also made extensive use of night bombing. Around 2/3 of all 8th and 16th Air Army sorties in September and October 1942 were for close support (day or night) or those strike's escorts, with fighter defence and reconnaissance running a distant second and third, and deep strikes of all kinds forming a bare handful of the total. The Soviet analysis credits heavy close air support as critical to the Army's ability to continue resistance, though the changes in mission profiles likely reduced the effectiveness of that support even while assisting in maintaining an air force in being. The Soviets were again echoing their 1920s analyses of the actions of a small air force, though it is not clear that the commanders in 1942 knew this.[391]

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[390] 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), p. 137-157), pp. 137-140.
[391] 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), pp. 141-145.

Table 5: **8th & 16th Air Army Sorties, September & October 1942**[392]

Mission	September 1942	October 1942
Close Support Strike	9,036	11,032
Airbase Strike	280	483
Railroad Strike	91	217
Strike Escort	3,282	1,441
Fighter Defence	2,698	1,529
Intercept	642	556
Reconnaissance	1,501	1,291
Transport	47	282
Total	17,577	16,831

The Germans suffered in these engagements as well. While the rate of loss was lower than that of the Soviets, the Luftwaffe units in the Stalingrad region were steadily ground down by combat and operational losses: one Stuka wing lost an average of an airplane a day over the course of four months. While no one loss was disastrous, the Luftwaffe was operating at the end of a tenuous supply line, and losses mounted faster than replacements arrived. At the beginning of Case Blue, Luftflotte 4 had around 1,150 operational aircraft. By the middle of September, Luftflotte 4 had 550 operational aircraft, and 402 on 20 November. By contrast, the Soviet 8th, 16th, and 17th Air Armies recovered from their nadir in September, when they possessed only 270 operational aircraft, to some 800 operational aircraft at the outset of Uranus. In the battle that had become the main point of effort on the Soviet-German front, the Luftwaffe had been reduced to one third of its initial operational strength, while in the same timeframe, the Soviets, despite higher overall losses, had tripled their strength, increasing their forces in the area from some 400 aircraft to just over 1,200. Equally, in the same timeframe, the Luftwaffe's operational readiness rate had declined from around 75% to 55%, while the Soviet's readiness rate had risen from 40% or worse early in the summer to around 75% at the outset of the offensive (which, combined with numerical growth, meant that

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[392] 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), p. 141.

effective Soviet air strength more than quadrupled from late June to late November 1942). It is true that a long supply line hampered the Luftwaffe's efforts. However, it is equally true that German industry was unable to maintain a sufficient flow of replacement aircraft, while the Soviet industry could. Equally, the Luftwaffe was not improving as fast as the Soviets. Soviet improvements are highlighted by the increasing supply of radios, which permitted effective ground-controlled interception of enemy aircraft by airborne fighters in the Stalingrad region from the second half of October 1942.[393]

Table 6: **8th, 16th, & 17th Air Army Strengths, 22 November 1942**[394]
Note: Readiness Rate ~75%

Air Army	Fighters	CAS	Day Bombers	Night Bombers	Recon	Total
8	284	273	65	122	7	751
16	114	105	0	93	3	315
17	82	40	0	79	0	201
Totals	480	418	65	294	10	1,267

Operation Uranus, the Stalingrad counteroffensive, jumped off on 19 November 1942 without the originally planned three days' preparatory assault on the Luftwaffe, due to bad weather. The weather also hampered air operations on both sides throughout the main attack, with the 8th and 16th Air Armies conducting only 3,769 sorties during the period of 23 - 31 November. This same bad weather also largely prevented the Luftwaffe from interfering in the operation, and the lack of a Soviet preparatory strike may have prevented the Soviets from losing surprise. Possibly the Soviets did not feel they had amassed a sufficient preponderance of force to attempt to suppress the Luftwaffe simultaneously with the opening of the offensive, though Stalin explicitly permitted Novikov to delay the offensive in order to ensure a sufficient preponderance of airpower.

However, the wartime after-action report on Uranus credits the Luftwaffe with having

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[393] Hayward, *Stopped at Stalingrad*, pp. 194-198, 210-211, 225-226; 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*, p. 137-157), pp.137, 141, 146-148; Timokhovich, *Operativnoe iskusstvo*, p. 280.
[394] 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), p. 148.

around 1,000 aircraft available. Luftflotte 4 had, in fact, 732 aircraft, of which only 402 were operational. Most probably, the Soviets did not feel the planned attack on the Luftwaffe would expose their intentions, and felt confident in the air strength they had amassed.[395]

However, the offensive did highlight the increased flexibility in Soviet command arrangements. The 8th and 17th Air Armies were each reinforced by a mixed air corps from the High Command Reserve in the weeks before the offensive, nearly doubling the strength of the 17th and increasing the strength of the 8th by a third. Equally, the 2nd Air Army, while remaining in the Voronezh Front, which was not part of the Uranus offensive, was operationally subordinated to the South-Western Front, tasked with the northern wing of the attack. Further reinforcements followed after the attack opened. This demonstrated that Novikov's reforms had brought the Soviet Air Force the ability to concentrate force where it was needed.[396]

From the Soviet Air Force' point of view, the subsequent siege of Axis forces at Stalingrad was dominated by the effort to prevent German resupply from the air. A year earlier, from February to May of 1942, the Soviets had besieged six German divisions near Demiansk, which the Luftwaffe kept supplied until they were relieved. The cost of this effort was enormous for the Luftwaffe, which lost 265 transports out of nearly 500 despite a quite limited Soviet air presence. The Soviets viewed the outcome as a failure, to be bettered on the next attempt. The Germans appear to have viewed it as a success, which played a role in their decision to attempt to maintain the forces trapped at Stalingrad by air.[397]

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[395] 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), p. 148-149; Hayward, Stopped at Stalingrad, pp. 225-226; permission to delay Uranus: G. K. Zhukov, *Vospominaniia i razmishleniia*, volume 2, (Moscow: Novosti, 1990), pp. 332.

[396] A. M. Samsonov, *Stalingradskaia Bitva*, (Moscow: Nauka, 1989), pp. 345-346, 566-581.

[397] Murray, *The Luftwaffe*, p. 120; Hayward, *Stopped at Stalingrad*, pp. 233-246; this section of Hayward contains an extensive and up-to-date examination of the decision to supply Stalingrad by air.

Nonetheless, the airlift seems to have caught the Soviets somewhat by surprise. While the lift began on November 25, Novikov did not command a response to it until November 30. On that date, he commanded the 8th and 16th armies to commit one fighter and one close support regiment each to combat enemy transport aviation, dividing the airfields in the pocket between them. Flights of 4 fighters and 4 close support aircraft were to organize ambushes against German transports, attacking them in the air and while landed.[398]

Though this did produce the intended attacks on German bases and aircraft, the results were not enough to satisfy Novikov. Early on 4 December 1942, Novikov issued a significantly expanded directive, blaming the commanders of the 8th and 16th Air Armies for poor organization of previous efforts and informing them that, 'You shall consider the destruction of enemy transport aircraft your fundamental mission.' All forms of aviation were to be thrown into the fray, with fighters keeping station over the German airfields to attack transports and radio for reinforcing fighters, and for bombers of all types to attack the transports on the ground. Night bombers were to harass the bases at night, in addition to frequent photoreconnaissance and daily reports to Novikov on progress and results.[399]

Late in December, Novikov arranged a system of four zones for the blockade. The first zone, outside the encirclement, was for strikes on German airfields supporting the airlift. The second zone, over the encircling ring, was divided into five sectors, each to be manned by a fighter division. By this point in the siege, the ring had been widened sufficiently to permit these fighter units, and associated close support units, to be based in the encircling ring, instead of east of the Volga. In addition, this zone sported an

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[398] V. I. Migulin, *Organizatsiia i osuchestvlenie vozdushnoi blokadi okruzhennoi pod Stalingradom gruppirovki protivnika: uchebnoe posobie*, (Moscow: Voenno-politicheskaia akademiia, 1975), pp. 12-13; text of Novikov's order, p. 31.

[399] Migulin, *Organizatsiia i osuchestvlenie vozdushnoi blokadi*, p. 13; text of Novikov's order, p. 32-33; attacks on bases in later November 1942 see Hayward, *Stopped at Stalingrad*, pp. 258.

extensive network of radio stations on the inner and outer encirclement rings to vector the fighters to incoming transports, and three radar stations on the most common German entry routes. The third zone, initially nestled in a band of 8-10 kilometres along the inner ring of encirclement but expanding throughout January, contained air defence artillery. The second and third rings were thus occupying the same airspace. Air defence artillery and fighter commanders were strongly encouraged to cooperate, and Soviet accounts suggest they did so. The fourth zone, inside the encirclement, intended to place the German landing zones under continual fighter patrol and bomber attacks, assisted by artillery fire from the encircling ground forces.[400]

By the time the last of the Stalingrad pocket collapsed on 2 February 1943, the airlift to Stalingrad had cost the Luftwaffe 488 transport aircraft and bombers. Around half of these were non-combat losses, a rate slightly higher than the Luftwaffe average of 43% for the period, and half due to the actions of the Soviet Air Force and air defence artillery. The servicability rate of the surviving aircraft had dropped to 30% (after a low of 20% in mid-January). Luftflotte 4 had been reduced to 624 aircraft from its strength of 1,610 when Case Blue opened, and only 240 of these were operational. Moreover, as in the previous year at Demiansk, the Luftwaffe had emptied its training establishments to provide transport aircrew, with disastrous results for the training program. While the Soviets had not completely prevented the Luftwaffe from providing resupply to the pocket, as Novikov demanded, and had themselves suffered extraordinary losses, they had nonetheless dealt the Luftwaffe a rate of attrition that Williamson Murray described as 'devastating'. The Luftwaffe did bounce back, providing significant support for Manstein's backhand blow against Soviet forces overextended in their drive for Kharkov

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[400] Migulin, *Organizatsiia i osuchestvlenie vozdushnoi blokadi*, pp. 13-17; 'Deistviia VVS v bor'be za Stalingrada', (*Sbornik materialov No. 6*), p. 149-155.

in February-March 1943, yet, as noted by Joel Hayward, 'the peak of its power was past'.[401]

Yet if the tide had begun to turn, this was not necessarily obvious to the Soviets at the time. The wartime after-action report on the blockade, unusually, fails to draw conclusions, and I. V. Timokhovich similarly largely avoids the topic of Stalingrad in his survey of Soviet Air Force operational art in World War 2. A short study from 1975 points up the overall success of the operation, but also points up Soviet faults in failing to organize the blockade sufficiently swiftly, failing to direct sufficient force against the transport bases outside the encirclement, difficulty with the weather, insufficient employment of radar, and poor placement of anti-aircraft artillery. Possibly the Soviet Air Force was uncomfortably aware that many of the most important improvements in the prevention of deliveries to Stalingrad came when the Soviet Army overran critical Luftwaffe bases, both inside and outside the pocket, forcing the Luftwaffe to undertake longer flights to poorer airfields.[402]

Perhaps the Soviets were simply more interested in later offensive operations by the time the after-action reports were compiled together and published in later 1943. These offensive operations did receive direct coverage, with conclusions. Air support for the Middle Don operation in late December 1942 was intended to open with a week of preparatory missions, concentrating on reconnaissance, railroad interdiction, strikes on Axis airbases, and assisting 5th Tank Army. The reason for the decision to initiate the air offensive before the ground offensive is not clear, but it appears to have been a variation in application, not in doctrine. When the offensive opened, the focus was to shift to close air support, first in the breakthrough sectors, and then in support of exploitation forces.

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[401] Hayward, *Stopped at Stalingrad*, pp. 283, 290, 310, 322-323, 332 (quote); Murray, *The Luftwaffe*, p. 120, 124 (quote), 199 note 192 [43% taken as an average of the stated 40.9% for July - December 1942 and 45% for January - June 1943].

[402] Migulin, *Organizatsiia i osuchestvlenie vozdushnoi blokadi*, p. 26.

These taskings suggest that when faced with a question of priorities, the Soviets chose close air support over air interdiction or offensive counter-air, a choice running counter to pre-war doctrine and theory. Between bad weather and limited forces, however, the 17th Air Army in fact concentrated solely on direct support to the 5th Tank Army and reconnaissance, with only 38 sorties of 1,263 devoted to railroad interdiction and 124 to airbase attack.[403]

While the offensive was underway, from 16 through 31 December 1942, most sorties were devoted to support the ground forces, both in the plan and in reality. In some instances, co-operation went well. The command post of the 5th Tank Army received intelligence of an enemy concentration at 0700 on December 20 1942. By 0800, two fighters had conducted reconnaissance and reported 70 tanks, 30 trucks, and a large number of infantry. From 0800 through 1400, a series of strike groups of 4-5 shturmoviks and 4-7 fighters kept the group under attack, culminating in a larger strike from 1500 to 1515 as preparatory fire for an ground attack, which succeeded.[404]

However, matters did not always go so well. On 18 December 1942, aerial reconnaissance detected large Axis railroad movements, but the Soviets were unable to bring any significant force to bear upon these lucrative targets. Concentration on close support inevitably meant reduced force on other targets, with 3,605 of 4,824 sorties by the 2nd and 17th Air Armies devoted to close support, its escort, and top cover for the front line during the period 16 - 31 December 1942. 409 sorties were devoted to reconnaissance, 293 to bombing airbases, and 517 to railroad interdiction (most of the latter at night). However, both the railroad interdiction and airbase strike efforts turned out to be scattered in both time and space, significantly reducing their impact; in the words of the anonymous Soviet analyst, "It is entirely understandable that the actions of a

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[403] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 25, 29-30.
[404] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 30-35.

limited number of aicraft on three rail lines did not produce the necessary results." The analyst called for a greater focus of effort, echoing Soviet theorists of the 1920s who called for more concentration of effort, not less, when faced with an insufficiency of force. Interestingly, the analyst did not comment on the relative value of interdiction as opposed to close air support.[405]

Equally, while close air support worked well during the initial stages of the offensive, it tended to break down during the pursuit. The ground force's analysis of both the Stalingrad and the Middle Don operations concluded that air-ground cooperation was generally poor, permitting the Luftwaffe to work over exploiting ground units 'unpunished', resulting in a suggestion of greatly increasing the anti-aircraft artillery assigned to tank and mechanized corps. Air support failed to break up or slow enemy reserves, and often failed to arrive on time for coordinated ground and air attacks. Air units also proved unable to move forward to new bases in order to maintain support of exploiting ground formations. The latter may be due, in part, to general logistics difficulties. The 3rd Mixed Aviation Corps was criticized for a very low sortie rate per aircraft per day of 2.5 during the Middle Don operation (as opposed to the highest rate, form the 282nd Fighter Aviation Division, of 6 to 10 sorties per aircraft per day, while night bombers averaged 4 strikes per night, all for the Middle Don operation). However, the report also notes that the 3rd Mixed Aviation Corps lacked fighter cover for its missions, repair equipment on its airbases, and often lacked fuel to fly, all while still based on the friendly side of the operation's start line.[406]

The Soviet Air Force had, in fact, tried to expand its forward basing opportunities, bringing 20 airbases into working order on newly-captured territory during course of the

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[405] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 35-40, quote p. 40.

[406] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 34-40; 'Nekotorie vivodi po ispol'zovaniiu tankovikh i mekhanizirovannikh korpusov dlia razvitiia proriva'. (*Sbornik materialov No. 8*), pp. 50-51 (quote on p. 50).

Middle Don operation and permitting some units to base forward from 26 December 1942. Nonetheless, the logistics difficulties just noted doubtless made it difficult to supply airbases forward of the start line. The Soviet analyst also noted that, 'The given operation demonstrates the great influence on effective combat work of timely organized signals with air formations (units), especially radio.' However, telegraph signals were not always available when needed, let alone radio, in light of which fighter and close support regiments frequently shared an airbase to permit good cooperation. The ground forces wanted close air support to be guaranteed to arrive no more than 30 minutes after it was summoned, and suggested the temporary subordination of air formations to specific tank and mechanized corps while those were engaged in a breakthrough. In fact, looking forward, all three of these were areas the Soviets would work out over the next few years, assigning an ever-greater number of radios to units, working out complex and ultimately successful plans for moving aviation forward with an offensive, and temporarily subordinating large air units to the ground units directly involved in a breakthrough.[407]

Flexibility still suffered, though not as much as had been the case previously. The air force analyst for the Middle Don operation criticized the 2nd and 17th Air Armies for dividing their airpower equally amongst the four armies involved in the offensive, and then not shifting them to hot spots, permitting Axis airpower to concentrate and overwhelm Soviet on chosen sectors of the front. The Soviet basing dispositions were intended to permit a similar concentration and flexibility, but were brought down by difficulties with communications, still the Soviets' Achilles' heel. The Soviets knew what they wanted to accomplish, but were still facing grave difficulties in bringing it

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[407] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 26, 37-40 (quote p. 40); 'Nekotorie vivodi po ispol'zovaniiu tankovikh i mekhanizirovannikh korpusov dlia razvitiia proriva', (*Sbornik materialov No. 8*), pp. 50-51.

about. However, they were aware of the difficulties and becoming steadily more successful in finding methods of overcoming them.[408]

The spring of 1943 found the Germans still holding onto the Kuban region south of Rostov. Most of the front experienced a pause in these months, recovering from the winter's fighting or building up for the collision both sides foresaw at Kursk. Over later April, May, and early June, a series of Soviet efforts in the Kuban created several massive aerial engagements. While the ground forces' goal was to clear the Taman peninsula of Axis forces, the Soviet Air Force entered this round of combat with the goal of attempting to destroy as much of the Luftwaffe as possible. They did not achieve this goal, but the Soviets did succeeding in using the operations as a deliberate school in which to hone their skills.

In fact, the initial actions quietly demonstrated that Novikov's earlier reforms had indeed increased the Soviet's ability to concentrate force. The North Caucasus Front opposing the Germans in the Kuban commanded two air armies, the 4th and 5th. Before the first of these engagements, these were reinforced with 3 reserve corps and 2 reserve divisions, the equivalent of a third air army. After the first engagement, the command staff of the 5th Air Army was sent to Kursk, leaving half of its units behind. These sweeping changes to the order of battle do not appear to have caused any untoward disorganization.[409]

At lower echelons, the Soviets engaged in extensive practice in aerial combat over the course of a series of engagements. Reading between the lines, radios finally became common in Soviet aircraft and forward ground control stations, because the lessons the Soviets wrote up regarding actions at the Kuban almost all revolve tightly around the

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[408] 'Deistviia aviatsii v Dekabr'skoi operatsii na srednem Donu', (*Sbornik materialov No. 9*), pp. 26, 37-40.
[409] K. A. Vershinin, *Chetvertaia vozdushnaia*, (Moscow: Voenizdat, 1975), p. 231; L. Shishov, 'Nekotorie voprosi operativnogo iskusstva VVS v vozdushnikh srazheniiakh na Kubani v 1943 godu', (*VIZh*, 5, 1983, pp. 21-29), pp. 22-23; Timokhovich, *Operativnoe iskusstvo*), pp. 42-44.

proper employment of radio and its extensive use. On the ground, they built an extensive network of ground control stations on the front line for the direction of fighters and close support aircraft, while in the air, they officially adopted flexible two- and four-ship pair tactics using vertical tactics, with radio providing the primary means of communications. In addition, methods of combat received intensive study. Commanders, including the commander of the Soviet Air Force, A. A. Novikov, and pilots studied combat results for lessons. The ace A. I. Pokrishkin proved key to this process, synthesizing his experience into punchy formulas, notably 'Altitude - Speed - Manoeuvre - Fire', and teaching them as widely as possible in both lectures, training flights, and demonstration mock combats. German commentators noted a distinct rise in the effectiveness and confidence of Soviet pilots from this point, with steady improvement such that one Luftwaffe commentator (in September 1943) labelled Soviet fighter escort as 'exemplary'.[410]

However, the Kuban fighting was but a dress rehearsal for the main event of the summer of 1943. The Germans had decided to launch their major offensive for the summer of 1943 against the Kursk bulge, and the Soviets, discerning this, planned to defend, then counterattack once the German forces were broken. While the Germans delayed, bringing up more forces and improving their preparations, the Soviets likewise built up their forces and turned the bulge into a fortress. This build-up demonstrates the swing of advantage from German to Soviet in the war in the east. In 1941, the Germans launched strategic offensives on three axes. In 1942, they launched a strategic offensive on one axis. In 1943, their one major offensive's goals were less decisive than in previous years, and the lengthening preparations suggest significant unease about its prospects. Kursk would also be the first major German offensive launched into the teeth

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[410] Vershinin, *Chetvertaia vozdushnaia*, p. 208-260; L. Shishov, 'Nekotorie voprosi', (Voenno-istoriicheskii zhurnal, 5, 1983, pp. 21-29), pp. 21-29; Von Hardesty, *Red Phoenix*, p. 143; Schwabedissen, *The Russian Air Force*, pp. 194-199, 208, 240-241, 250 (quote from p. 208, cited as Colonel Kupfer, 'Verhalten russicher Jagdflieger', 10 September 1943, p. 1).

of a Soviet defence that was neither surprised, as in Barbarossa, nor seriously weakened by prior fighting, as in Typhoon and Blue. Unfortunately for the Germans, this meant an offensive in which their steadily diminishing advantages in tactical flexibility and prowess were reduced still further by extensive Soviet preparation.

The air war for the Kursk battle began with base construction and raids by both sides. Both sides improved the local airbases, though the Soviet after-action report notes that the Germans gained a distinct advantage in that, being on the offensive, they could site fighter bases 18-30 kilometres from the front line, and a handful only 5 or 6 kilometres from it. The bulk of the German bases were within 50 kilometres of the German attack axes, while few of the Soviet bases were within the same radius. As a result, the Germans had an easier time achieving a higher sortie rate in the battle, serving to offset their overall numerical inferiority: the Soviets had 2,453 aircraft (of which 339 were not functional, an excellent 86% readiness rate made possible by deliberately low sortie rates), while the Germans fielded 1,850, 28% of the entire Luftwaffe. The force structures were not identical, however, with 1,000 Soviet fighters facing 600 German, 750 Soviet close support aircraft facing 100 German, 670 Soviet bombers to 1,000 German, and, highlighting the Soviet's reliance on fighters for reconnaissance, 14 Soviet reconnaissance aircraft, of which only 4 were functional, to 150 German.[411]

The German advantage in reconnaissance was, in turn, offset by the usual, and increasingly effective, Soviet deception efforts. The 2nd Air Army, for example, built 17 fake airbases, staffed them with 158 fake aircraft, kept the fake aircraft moving about on the fields and periodically landed real aircraft at them. In June 1943, the Soviets counted 35 German raids on the 2nd Air Army's bases, of which 29 struck the false airbases. On

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[411] Murray, *Luftwaffe*, p. 157-159; 'Deistviia aviatsii v Kurskom srazhenii', (*Sbornik materialov po izucheniiu opita voini No. 14, Mart - Aprel' 1944 g.*), (Moscow: Voenizdat, 1944), pp. 160-163, 166. Percentage of the Luftwaffe figure based on Murray noting that 'total [Luftwaffe] losses for all theaters in July and August were 3,213 aircraft (50.6%)' (p. 159); this gives a total strength of roughly 6,500, of which 1,850 is 28.46%.

the other hand, Soviet efforts were hampered by good German organization. In a move straight out of Soviet 1920s theory, and practice in 1930s China, many of the German aircraft moved into their bases the evening before the offensive began on 5 July 1943.[412]

The Soviets had planned to conduct two or three days of preparatory bombardment of German positions before the German offensive began. However, the Soviets were not certain when the offensive would begin until the evening of 4 July 1943, as a result of which the planned first stage of the operation was not conducted. Stage 2 of their plan covered the battle in the covering regions, expected to last one day, and Stage 3 covered support for ground forces as the Germans attempted to penetrate the main defence. The long preparation time ensured the Soviets were able to send air unit commanders to coordinate planning for both the air and ground battle with the ground units they were to support, for both the defensive and counteroffensive stages of the engagement, in several variants to cover possible German courses of action. In addition, the air armies were intended to send representatives to the command posts of the armies and fronts they supported. This did not entirely work out in practice. The 2nd Air Army, which defended against the southern German attack, not only failed to send representatives, but also failed to establish good communications with ground force command posts. Defending against the northern assault, however, 16th Air Army, sent 13th Army an operations group that was equipped with radios, headed by the representative of the air army commander, and blessed with the authority to command air units directly. The operations group participated in planning the ground operation and visited forward command points. In the words of the Soviet analyst,

> As shown by the experience of this operation, such trips by aviation officers to ground force headquarters with the goal of resolving questions of cooperation, and becoming familiar with the conditions of their forthcoming work, have great importance.[413]

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[412] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 161-163.
[413] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 163-166; quote p. 164.

Despite the extensive time for preparations, other failings also surfaced. As noted in the after-action analysis, neither the 2nd nor the 16th Air Armies managed to deploy their forward radio command posts effectively, the 16th placing them too far from the front, the 2nd's radios failing to work in some instances, and neither sending specific commanders with the responsibility and authority to command aircraft from the posts. Although the analysis does not say so, it is probable that the radios, which were not tested prior to their failure, were not tested because of signals security concerns. Regardless,

> Insufficient organization of the observation, warning, and command of fighter aviation by radio in this operation greatly complicated the fulfilment of aviation's most important mission: winning mastery of the air.[414]

Other methods of winning mastery of the air also failed to work as planned. At dawn on July 5th, the 2nd Air Army, defending the southern sector, launched a massive strike against the German airbases at and around Kharkov, with assistance from the neighbouring 17th Air Army. 417 aircraft took direct part in the raid, which was detected by German radar and heavily engaged. The Soviet reports at the time attribute the lack of success to the German aircraft having already launched from their bases; the Germans claim to have slaughtered the strike as it moved into their airspace, and the near-total Soviet silence on the raid is telling. For the rest of the engagement, the Soviet Air Force went back to doing what it did best, close air support, flinging a tremendous weight of firepower in the direct of the German ground forces: the 16th Air Army alone expending 2,000 bombs, 23,315 anti-tank cluster bombs, over 4,000 canisters of incendiaries, 4,000 rockets, and around 566,000 rounds of cannon and machine gun ammunition during the defensive stage of the operation (from 5 through 10 July 1943).[415]

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[414] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 167 (quote p. 167).
[415] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 168; I. V. Timokhovich, *Sovetskaia aviatsiia v bitve pod Kurskom*, (Moscow: Voenizdat, 1959), pp. 49-52; Von Hardesty, *Red Phoenix*, pp. 159-161.

Despite the intensity of the struggle, the sortie rates of Soviet bombers and close support aircraft remained low, partly due to the basing issues mentioned earlier, partly because fighter aviation was committed too heavily to patrolling the front lines to provide escort, and also very likely due to a desire to preserve the force's readiness for the planned counteroffensive. In any event, while Soviet sortie rates declined over the course of the operation, they did so less precipitately than those of the Germans. Soviet sorties averaged 1,500 per day from 5 July through 12 July 1943. While the Luftwaffe started at 4,298 on 5 July to 3,140 Soviet, this fell to 2,100 on 6 July, against 3,227 Soviet. By 9 July 1943, the Luftwaffe managed only 350 sorties on the northern wing of the operation, while the Soviets launched 956 sorties in the same sector. The Soviet analysts at the time concluded that the Soviet Air Force won air superiority on 7 or 8 July 1943 on the northern flank of the Kursk bulge, and on 11 July on the southern flank.[416]

The Soviet Air Force continued to work on improving, both during and after Kursk. Fighters became better at escorting bombers and close support aircraft, and large bomber strike groups were assembled instead of penny packets being scattered onto various targets. The Soviets were discovering that concentration of force made good sense in conditions of superiority as well as inferiority:[417]

> According to the testimony of ground troops and observations of aircrew, concentrated blows of large groups of aircraft not only produced a strong impact on enemy troops, but also sharply raised friendly troops' morale.[418]

The Soviets also noted that larger strike groups were more effective at disorganizing and confusing enemy air defences, as a result of which the strike aircrew could conduct their attacks more calmly and effectively.[419]

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[416] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 168-170, 176-180; Von Hardesty, *Red Phoenix*, pp. 163-165; Murray, The Luftwaffe, p. 158.
[417] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 181-184.
[418] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, p. 184.
[419] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 181-184.

Problems remained, however. The Soviets did not have sufficient fighter aviation to cover all the missions it was tasked with, not least due to over-commitment of large groups of 18 to 30 aircraft to 'passive methods of combating enemy aviation' such as patrolling given sectors of the front or specific targets, instead of escorting strike aircraft or being vectored to intercept enemy activity. As a result, insufficient fighters remained for Soviet strike packages at Kursk, which accounted in part for their low sortie rate. When the ferocity of the ground battle demanded more sorties from strike aircraft, on 8 and 12 July, they were sent in with insufficient fighter escort, and the resulting increase of only 100-150 sorties more than doubled the strike aircraft's losses on those two days. Fighter employment improved as the battle wore on, moving slowly towards increasing reliance on offensive counter air instead of defensive measures, as a Soviet analyst noted and recommended:[420]

> Success in the battle for mastery of the air is achieved not only through numerical superiority in aircraft, their quality, and the training of aircrew, but also through correct organization of combat with enemy aviation. In this operation, despite numerical superiority in aircraft (of over one and a half times in fighters), in the first half of the operation we did not possess mastery of the air. The fundamental reason for this is that our aviation, conducting the battle for mastery of the air, did so with passive methods while the enemy utilized active methods of battle.
>
> Fighting for mastery of the air, aviation must move its actions onto enemy territory and there widely employ methods of free hunting, as well as the destruction and blockading of enemy aircraft at their airbases. Fighter aviation is efficiently used on the battlefield en masse to completely cleanse the air of enemy aviation at the times our bomber and close support aviation will operate, only detailing a small force for close escort.[421]

When they did arrive on the battlefield, the strike aircraft did not always achieve their intended result because the Soviet command system could not always keep up with rapidly changing battlefield conditions. For example, the 17th Guards Rifle Corps expected air support for a counterattack on 6 July 1943. However, while the support was

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[420] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 181-187, (quote p. 183). Unfortunately, this report is coy about the actual losses per day.
[421] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 187.

summoned in a timely manner by the 16th Air Army's representative at 13th Army, it failed to arrive on time and also failed to arrive where it was needed because the battlefield had changed too much by the time the strike aircraft arrived, and the 16th Air Army representative was unable to provide updated information to the strike while it was en route to the target. 16th Air Army, however, apparently did rather better than 2nd Air Army, which failed to deploy liaison officers by the beginning of the battle despite the extended preparation time. This absence caused extra steps in the communications chain, since calls for aircraft had to go from front line armies and corps up to the front headquarters, and then had to be passed down through the 2nd Air Army chain of command. By contrast, the 16th Air Army's representative with 13th Army, at the German point of attack, had the power to summon air units directly from their bases, bypassing numerous steps and shortening response times. 2nd Air Army attempted to fix this problem, sending representatives to the 1st and 5th Guards Tank Armies by 10 July 1943, but these representatives were not given the power to call for aircraft, and thus only served to provide information to the 2nd Air Army headquarters about the situation at the front, instead of improving its reaction time. The Soviet analyst at the time asserted that poor reaction times, usually caused by signals and liaison problems, constituted one of the greatest shortcomings of the Soviet Air Force performance in the operation. However, both the analyst's commentary and the actions of 16th Air Army, and to a lesser degree those of 2nd Air Army, show that the Soviets understood the effect they wanted to achieve and the means of achieving it: the devil lay in the details of implementation.[422]

Lack of information about the front line, combined with 'poor designation of the front line by ground forces', led to numerous friendly fire incidents. The poor designation resulted, in part, from smoke and dust reaching 10 to 15 kilometres from the scene of the fighting - apparently a common occurrence in intense battles - which

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[422] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 183-186.

rendered marking panels invisible from the air. Signalling rockets were still effective, but were not used as the primary means of marking the front line until later in the operation. In addition, this provides further evidence of the Soviet's failure to organize effective forward control groups for their strike aircraft. As with effective forward control of fighters used with some success at Stalingrad and the Kuban, but apparently less so at Kursk, the concept was familiar, but it was not always effectively implemented.[423]

Kursk also demonstrated the similarity in focus of the Soviet Air Force and the Luftwaffe. Neither air force committed any significant forces to a deep battle, instead concentrating on the front lines. The Soviets devoted all of 139 sorties (out of 26,019) to interdicting German railroads, and all of these came out of Long Range Aviation's 2,299 sorties. Equally, the Soviets concentrated on attacking German airbases only once during the operation, after which nearly all sorties were concerned with the front line. The Luftwaffe, too, conducted almost no activity beyond the Soviet front line. As noted by the ever-anonymous Soviet analyst, both side's desire to maintain secrecy for their build-ups explains the absence of air activity in the operational depths before the operation commenced. Given the massive numbers of available aircraft, however, the absence of significant efforts at air interdiction, by either side, is a compelling demonstration of where each felt its primary duty lay: close air support for the army in its hour of need.[424]

Nonetheless, the air engagement over Kursk is as indicative of the steadily changing fortunes of the war in the east as the ground engagement. On the ground, the Soviet army absorbed a full-scale German offensive, stopped it cold, and then launched its own massive and highly successful counterattack. In the air, the Soviet Air Force went head to head with the Luftwaffe. Over the Kuban, they fought each other to a draw.

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[423] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 186.
[424] 'Deistviia aviatsii v Kurskom srazhenii', *(Sbornik materialov No. 14)*, pp. 182-183; David M. Glantz, Jonathan M. House, *The Battle of Kursk*, (Lawrence: University of Kansas Press, 1999) p. 271; final phrase paraphrases A. Lapchinskii, *Bombardirovochnaia aviatsiia*, p. 47.

Over Kursk, the Soviet Air Force won. Its performance was by no means perfect, just as that of the land forces showed room for improvement. Nonetheless, the Soviet Air Force had recovered from its 1941 debacle and demonstrated that it could take the Luftwaffe head-on in a major engagement, and emerge the victor: a remarkable achievement.

The Soviets continued to be interested in improving their performance. Training methods were revised in early 1943, including a regular rotation of instructors forward for short tours on the front line to ensure their remained current. Flight training programs increased from a January 1942 low of 6 hours of flying time towards 34 hours in early 1943. Flight training paid increased attention to combat maneuvers. In January 1943, the Soviets formed the Main Directorate of Combat Training for Frontal Aviation, dedicated to training pilots to a higher standard through various methods, including demonstrations and group exercises. Equally, the Soviets appear to have begun to bring some highly qualified pilots out of the front line and into their training programs: Igor Kaberov, a Baltic Fleet ace and one of those who, before the war, had been made an instructor pilot immediately upon completion of flight school, was commanded to return to his job as an instructor pilot in August 1943. This may have been only a Navy action, as Soviet Air Force pilots appear to have remained at the front. However,front line pilots were also expected to teach, as shown by the actions of aces such as Pokrishkin at the Kuban.[425]

Yet the largest change to the air war in the east was the expansion of the air war in the west. In the process of Kursk and the counteroffensives following it over course of July and August 1943, the Soviet Air Force destroyed 1,030 Luftwaffe aircraft, equal to 16% of the entire Luftwaffe on 30 June 1943. At the same time, the Anglo-American air forces destroyed 2,183 Luftwaffe aircraft. In total, this effort inflicted a stupendous loss

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[425] Igor Kaberov (translated by Peter Rule), *Swastika in the Gunsight*, (Stroud: Sutton Publishing Ltd, 1999), p. 58, 194-196; von Hardesty, *Red Phoenix*, p. 143, 179; Shishov, 'Nekotorie voprosi', (*VIZh*, 5, 1983, pp. 21-29), pp. 21-29; Iu. I. Maslennikov, *Podgotovka letnogo sostava v boevikh usloviiakh*, (Moscow: Voenizdat, 1987), pp. 8-13.

rate on the Luftwaffe, destroying 50.6% of the Luftwaffe's 30 June 1943 strength. Faced with an attrition rate that would swiftly lead to its utter destruction, the Luftwaffe chose to concentrate on home defence, effectively ceding air superiority to its enemies on all other fronts. In 1941 and 1942, the Luftwaffe was able to focus support in the east. In 1943, threats and losses in the west grew steadily, causing the proportion of Luftwaffe strength in the east to fall even before the Kuban and Kursk, while fighter losses were higher in the west than the east from March 1943 through the end of the war. In 1942, the Soviets inflicted around 60% of all Luftwaffe losses. By the end of 1943, the Luftwaffe's primary commitment and attrition had moved to home defence. Commitments to others fronts were consequently much reduced, though the steadily growing scale of Axis disasters in the east ensured that the Luftwaffe continued to maintain a presence there.[426]

If the air war in the west had not soaked the Luftwaffe away from the east, the Soviet Air Force's victory at Kursk suggests it would likely have increased its degree of dominance over the Luftwaffe nonetheless. However, the Luftwaffe had in effect conceded air superiority to the Soviets. German accounts make a brave face of this, noting their ability to seize air superiority in local areas for limited periods of time - exactly the sort of 'small air force' strategies that the Soviet Air Force employed during its own time of inferiority. The Luftwaffe continued to inflict losses on the Soviet Air Force in 1944-1945, just as the Soviet Air Force had administered punishment to the Luftwaffe in 1941-1942. Yet whereas in 1941-1942 the balance was swinging in favour of the Soviet Air Force, the balance in 1944-1945 swung ever further against the Luftwaffe, not only in quantity but also in quality. 1943 turned out to be the Soviet Air Force' most difficult year, with its highest loss rate, at 8,255 officer aircrew, 39.2% of all

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[426] Murray, *Luftwaffe*, p. 113, 124, 157-159, 174, 182-183, 245-251; Glantz, House, *The Battle of Kursk*, p. 39.

active officer aircrew[427], but in that year they demonstrated that the air war would continue to move in their favour, whether the Luftwaffe were soaked away or not.

Despite the commitment of the Luftwaffe away from the Soviet front, however, Soviet Air Force losses did not decrease. [Please see chart series 'Soviet Air Force Loss Rates'.] Numbers of aircraft rose steadily, doubling between January 1943 and January 1945. Non-combat losses fell slowly in absolute numbers, and significantly as a percentage of aircraft available and in aircraft lost per thousand available per month. This indicates that Soviet training programs were producing better pilots more adept at avoiding accidents in operating their aircraft, which accounted for half of all losses in 1941. Combat losses of aircraft, however, rose in absolute terms. This could make sense simply as an effect of there being more aircraft at the front, and thus in harm's way, but the number of aircraft lost to combat also rose in terms of losses per thousand available aircraft per month. Every other indication on the quality of the Soviet Air Force suggests its combat performance was steadily improving, and crew losses were at their worst in 1943, which makes the increase in loss rates seem anomalous. Several other factors may have combined to produce this effect. First, the higher losses may have resulted from increased levels of air defence weapons along the front lines. Second, the flood of new aircraft from the factories may have made units at the front more willing to write damaged aircraft off instead of repairing them. Third, the losses may reflect a higher sortie rates and more aggressive missions due to an awareness that replacements were available, creating a higer loss rate in 1943 in the same manner that Soviet efforts at force preservation created the lower loss rates of 1942. None of these hypotheses can be

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[427] Kirovsheev, *Soviet Casualties*, p. 222.

proven without further research, and the often-chaotic state of Soviet wartime loss records may mean that no answer will ever be forthcoming.[428]

Regardless, the Luftwaffe did in fact focus away from the east. This fact is demonstrated indirectly by the change in Soviet planning. Through Kursk, Soviet Air Force planning and attention placed a high priority on dealing with the Luftwaffe. After Kursk, the Luftwaffe increasingly became a non-factor in Soviet Air Force planning. This fact likely underlies the limited use the Soviets made of strikes on Luftwaffe airbases, another anomaly of the Soviet Air Force war effort. While pre-war theorists and commanders debated the effectiveness of offensive counter-air, and pre-war doctrine called for extensive strikes on enemy airbases, only 2% of all sorties by Frontal Aviation were directed at airbases during the course of the war:

Table 7: **Soviet Air Force Frontal Aviation Attacks on Enemy Airbases**[429]

	1941	1942	1943	1944	1945
Sorties per Month	1,116	1,452	1,247	1,027	2,148
Percent of All Sorties	2.8	3.2	2.0	1.5	1.4
Percent of Destroyed Enemy Aircraft	15.6	33.3	32.4	12.9	5.8

As table 7 illustrates, in the first half of the war, while the Luftwaffe was heavily committed in the east and the Soviet Air Force was struggling to survive, the Soviet Air Force made more extensive use of strikes on airbases in terms of sorties allocated to the task. In addition, the Soviets thought the effects in 1942 and 1943 were significant, as those few sorties account for around a third of all enemy aircraft claimed destroyed. Even so, strikes on airbases were used only rarely, never rising above 3.2% of all sorties.

Soviet historian I. V. Timokhovich suggests four reasons for the disjoint between

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[428] Kirovsheev, *Soviet Casualties*, pp. 222, 254-255. Murray (*Luftwaffe*, p. 249), notes that German close support losses rose steadily in the east as Soviet anti-aircraft density rose.

[429] Timokhovich, *Operativnoe iskusstvo*, pp. 92-93. The enemy kill claims are based on Soviet kill claims and thus are untrustworthy (as are all kill claims, from any nation, without specific evidence from the side suffering the losses) except as evidence on Soviet attitudes about the effectiveness of strikes on airbases - which is the relevant point here.

perceived effectiveness and underutilization. First, concentrating bomber and close support assets on the close support mission resulted in strikes on enemy airbases tending to occur only during operational pauses. Second, the absence of long-range escort fighters made daylight bombing of enemy airbases too expensive in losses. Third, Timokhovich points to the difficulty of finding airbases and the complexity of the strike operations themselves, leading to his fourth point, that as a result of these difficulties, many in the Soviet command structure did not highly rate strikes on bases as a method of combating enemy aviation.[430]

Soviet air reconnaissance was indeed often weak, with some 81% of all reconnaissance missions in the course of the war flown by non-reconnaissance aircraft in air units not specializing in reconnaissance. Furthermore, most of Soviet air reconnaissance was conducted by the pilot's eye, not by photograph, due to the low availability of reconnaissance cameras. Only in 1944 did photoreconnaissance missions begin to account for over half of all reconnaissance sorties. This weakness could easily have led to the difficulties Timokhovich points out in locating enemy airbases. Equally, Palashevskii's post-war analysis of Soviet offensive counter-air, notes that in 1944 and 1945, the Luftwaffe was small enough to disperse over too many airbases to make strikes on airbases a particularly effective, and also tended to base beyond the range of fighter escort and the close support aviation the Soviets preferred to include in strikes on airbases. Frontal Aviation's focus on close support is equally to the point: given the option of directly assisting land forces, or bombing airbases, the Soviets had a marked preference for direct support, although pre-war theory and doctrine called for a much heavier effort on air interdiction and offensive counter-air than the Soviets attempted in World War 2. Combining all these factors with the Luftwaffe's withdrawal, however, makes the picture more complete. Difficulties in coordination and reconnaissance

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[430] Timokhovich, *Operativnoe iskusstvo*, pp. 92-95.

prevalent through 1943 meant that the Soviets were imperfectly impressed by the outcome of airbase attacks in that period, but by the time reconnaissance and coordination improved, the target had also melted away. The Soviets continued to attack airbases on occasion in 1944 and 1945. However, offensive counter-air is primarily a tool of gaining or ensuring air superiority. This was a matter of critical concern from 1941 through 1943, but not in 1944 and 1945; and not coincidentally, Soviet sortie rates on airbase strikes were distinctly higher (though still low) in 1941 through 1943. Since Soviet Air Force prowess in those years was not always great, it is unsurprising that many commanders concluded airpower was better employed supporting the ground forces, which could shut down enemy airbases in a quite decisive manner by putting tanks on their runways, as happened during the battles around Stalingrad. Thus, while the Soviets recognized the theoretical effectiveness of offensive counter-air, when air superiority had already won in the later war, they prioritised ensuring the ground forces advanced with maximum speed over crushing the remnants of the Luftwaffe: a case of specific circumstances trumping theory, but not invalidating it.[431]

The change in the scope and effectiveness of Soviet efforts can be seen over the course of 1944 and 1945 through the lens of one of their largest offensive operations, Bagration. Ordered on 31 May 1944 and launched on 22 June 1944, Operation Bagration exemplifies many of the trends in the Soviet's growing military abilities. Extensive and carefully prepared deception measures ensured that the German high command remained focused on Ukraine, the scene of more recent Soviet offensives, until 25 June. German forces were thus concentrated in the south of the Pripiat, while the Soviets had concentrated their striking power in the north, unnoticed by the Germans. From 22 June

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[431] I. Palashevskii, 'Deistviia sovetskikh VVS po aerodromam protivnika', (*Voenno-istoriicheskii zhurnal*, 9, 1976, pp. 21-28); Timokhovich, *Operativnoe iskusstvo*, pp. 94-95, 122-125. Interestingly, Timokhovich defends eyeball reconnaissance as superior to photographic, because of the speed with which spotted targets can be relayed to strike units.

through 4 July, four Soviet Fronts surged forward, recapturing most of Belorussia and destroying 25 Axis divisions of an initial 38 in the sector. The offensive in Belorussia continued onwards thereafter at a somewhat reduced pace due to the need to refit and resupply, finally ending at the gates of Warsaw at the end of August 1944. Meanwhile, the Soviets uncorked offensives into Czechoslovakia and Romania, whose Axis defences were weakened by the need to reconstitute their shattered front line to the north. These offensives captured the Ploesti oilfields by 2 September 1944, further damaging the already parlous state of German petroleum supplies.[432]

On the eve of Bagration, the Soviet Air Force demonstrated its increasing ability to reinforce selected sectors. Four air armies were engaged in the operation, and two of them, the 1st and 16th, were reinforced from reserves. The 1st received four corps and four divisions totalling 1,506 aircraft, while the 16th Air Army received five corps totalling 1,047 aircraft. Moreover, the Soviet basing structure was well able to handle this influx of aircraft. Between the four air armies, the Soviets had basing for 7,000 aircraft, and only disposed of 5,357 to put on them. This further enabled the Soviets to cloak their build-up by moving their air units forward in small groups, under low cloud cover, during the last three days before the opening of the offensive.[433]

Preparing for the offensive, the various Soviet Air Force divisions and corps, and supported ground formations, conducted training and wargames to test and refine methods of controlling air units over the battlefield, and backed these up with manoeuvres in which ground forces took part. This allowed the Soviets to test and improve communications and organization before the offensive opened. During the breakthrough portion of the offensive, representatives of each front's air army were stationed forward with key attacking corps, army, and Front headquarters. Communications were routed

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[432] Glantz, House, *Titans*, pp. 201-221; Murray, *Luftwaffe*, pp. 285.
[433] 'Aviatsionnoe obespechenie Belorusskoi operatsii', *(Sbornik materialov No. 20)*, pp. 84-86.

via front headquarters to the air army headquarters, and thence to the air units, each stage usually operating by radio. The forward air army representatives also had direct radio links to the air army commander. This system was intentionally highly centralized, in order to preserve the ability of the air army commander to shift the focus of effort as needed. Nonetheless, the Soviets saw the need for sufficient flexibility to permit the representatives with forward exploiting units to call for airpower directly on occasion. Interestingly, Novikov ordered greater command flexibility in July 1944, yet the analyst was at pains to emphasize the preservation of command centralization in this operation, and the command structure is in some respects more centralized that that used at Kursk, although it appears to have been more flexibly so in operation.[434]

Direction of aircraft in flight at the front was accomplished through forward direction stations using radio, and problems experienced at Kursk with designation of the front line appear to have been solved through extensive use of smoke, rockets, and occasional use of dry firing passes to ensure identification of targets as friendly or enemy. In addition, the primary forces tasked with exploiting the breach had air army representatives with radio links back to the air army headquarters. Densities of aircraft reached 100 fighters, 100 close support aircraft, and 60 bombers in zones 6 to 10 kilometres wide and 30 kilometres deep in the primary breakthrough zones, with the bombers usually operating in groups of 30 to 60 aircraft to pound major strongpoints. Close support aircraft usually operated in smaller groups to provide a more constant presence, both on the front line and acting to suppress German artillery, mortars, and troop movements. The latter proved particularly effective when directed against retreating German forces channelled onto roads and paths by the region's swamps, thus

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[434] 'Aviatsionnoe obespechenie Belorusskoi operatsii', (*Sbornik materialov No. 20*), pp. 86-98; Hardesty, Red Phoenix, p. 192.

delaying these columns, preventing them from deploying into new defensive lines, and assisting in their encirclement and destruction.[435]

Mobile forces were provided with extensive direct support in entering the breakthrough zone and during exploitation. For example, the 3rd Belorussian Front's 5th Guards Tank Army had a corps each of fighters, bombers, and close support in dedicated support, and had the commanders of those corps at its headquarters to speed communications, while the 1st Belorussian Front's 9th Tank Corps had two close support corps in addition to continuous fighter cover. Each tank brigade of the exploiting tank corps had a specially outfitted tank with a communications officer for communications with supporting aircraft. As these ground formations drove westwards, they were escorted by groups of close support aircraft directed at points of resistance as they were encountered. These were both in larger groups available to be called for as required, with an average delay of 15 to 25 minutes, in addition to a steady stream of small groups of aircraft for immediate suppression.[436]

Those same range limitations had hampered air support to prior major Soviet offensives when they drove deep, and thus out of the range of air support. For Bagration, the Soviets organized teams to move just behind the forward detachments of the exploiting forces. These truck-mobile teams of each comprised a detachment from an airbase service battalion, plus the engineering staff necessary to secure and prepare an airfield for use. The number of these teams varied from air army to air army in proportion to the number of air divisions it possessed, with the overall proportion apparently around one team per two divisions. Each team was expected to be able to prepare an airbase for use by a close support or fighter regiment within two or three days.

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[435] 'Aviatsionnoe obespechenie Belorusskoi operatsii', (*Sbornik materialov No. 20*), pp. 91-92, 97-100, 103.
[436] 'Aviatsionnoe obespechenie Belorusskoi operatsii', (*Sbornik materialov No. 20*), pp. 100-101; 'Vzaimodeistvie shturmovikov s tankami', (*Informatsionnii biuleten' No. 25 (1 - 15 Noiabria 1944 g.*), pp. 4-21), pp. 8-15.

These groups functioned as intended as the operation progressed. Forward detachments seized airbases and provided security while the preparation teams went to work, enabling the Soviets to keep their air support moving forward with their armoured spearheads.[437]

This ability was a key part of the 'aviation offensive operation', the Soviet concept summing up their intentions and exemplified by Bagration: massive force employed flexibly yet in concentration, moving forward with the ground force's spearheads to provide them with continuous cover and fire support. The initial mention of this concept, in the *Boevoi ustav pekhoti RKKA Krasnoi Armii* (*Red Army Infantry Combat Regulations*, signed 9 November 1942), envisioned it as close air support for the tactical breakthrough, delivered in conjunction with artillery fires. By the end of the war, the Soviets saw it as consisting of two distinct stages: preparation of the attack, consisting of massed strikes shortly before attack jumped off; and accompaniment of penetrating forces, during which aviation ensured a constant supply of close air support for advancing forces and warded off enemy aircraft's attempts to interfere. Ensuring the rapid capture and exploitation of airbases close to the advancing spearheads proved a critical piece of this support. However, while this concept certainly relates to pre-war concepts of massed employment on the decisive ground axis, it bears little relation to the pre-war concepts of concentrating that effort on air interdiction, and does not really deal with counter-air operations.[438]

The various measures taken by the Soviet Air Force to improve the quality of its support and maintain it into the depths evidently succeeded. In contrast to previous operational analyses, the Soviet Army had no direct complaints about the air support provided, noting heavy air support throughout the campaign except when 3rd Air Army's fuel supplies were interrupted, which did create difficulties for the 1st Baltic Front which

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[437] 'Aviatsionnoe obespechenie Belorusskoi operatsii', (*Sbornik materialov No. 20*), pp. 87, 102.
[438] M. Kozhevnikov, 'Sovershenstvovanie aviatsionnogo nastupleniia', (*Voenno-istoriicheskii zhurnal*, 5, 1971, pp. 14-21).

it was supporting. Further support for the effectiveness of Soviet Air Force arrangements comes from the Germans, who 'discovered from captured documents that the Soviet procedures for command and control of their ground attack force were hardly less sophisticated than their own', and was also equal to systems for close support in use by the British and Americans.[439]

The Soviet Air Force, while doubtless taking losses itself at the rates noted above, crushed the Luftwaffe units facing them. Even though the Luftwaffe rushed more fighters to Belorussia from other regions in the east and also, unusually, from the west and from homeland defence, Luftwaffe strength in the east declined by 325 aircraft, to 1,760, over the course of June and July. The degree of the overmatch is also reflected in the Soviet Air Force analysis of the operation, which dedicates only a few occasional sentences to operations against the Luftwaffe in the air or on its airbases. Again, this is also reflected in studies of the Luftwaffe side of the campaign. Williamson Murray states that 'the Luftwaffe played no effective role' in Bagration, while Richard Muller notes that the Luftwaffe could no longer achieve even local air superiority by autumn 1944, though its loss rates were lower in the east than in the west. In part, Soviet dominance in the air was due to their immense numerical superiority: 5,357 Soviet aircraft opposed 775 German aircraft at the outset of the Bagration offensive.[440]

These ratios moved even further to the Soviet's favour as the war continued. In addition to sheer numbers, the Soviets continued to work on improving both their ability to control aircraft at the front line, and their flexibility in shifting the point of maximum support. Their ability to keep Soviet Air Force units moving forward is shown in the

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[439] David M. Glantz, Harold S. Orenstein, *Belorussia 1944: The General Staff Study*, (London: Frank Cass, 2001), pp. 134-135, 138, 149, 151, 171, 206 [this is a translation of *Sbornik materialov po izucheniiu opita voini No. 18, Mai - Iun' 1945 g.*]; Murray, *Luftwaffe*, pp. 285-286 (quote p. 286); Muller, *German Air War*, pp. 225-227 (quote p. 226); Richard Hallion, *Strike from the Sky*, (Washington: Smithsonian, 1989), p. 232.

[440] Murray, *Luftwaffe*, pp. 285-286 (quote p. 286); Muller, *German Air War*, pp. 225-226; 'Aviatsionnoe obespechenie Belorusskoi operatsii', (*Sbornik materialov No. 20*), pp. 85.

example of the East Prussian operation in January-March 1945, where in addition to the mobile groups of the previous summer, the Soviet Air Force identified 53 locations they specifically desired to capture and integrated this into the operation's planning. This enabled the Soviets to continue to provide thousands of sorties per Air Army per day in support of critical stages of the operation despite winter weather, with a high point of 14,156 sorties by the 4th Air Army in the first three days of the offensive. While the Soviets still saw close air support and covering their own forces form enemy attack as their primary mission, the missions assigned to the air armies also included requirements for attacks on German headquarters, command and control systems, railroads, and interdiction of reserves. However, though the Soviets appear to have been increasing the forces allocated to tasks aimed at deeper portions of the German battle array, interdiction appears to have remained a weak point relative to the actions of the Western air forces.[441]

In part, this is because of the Soviet's continued tight focus on close support. An analysis of the role of bomber aviation, printed in October 1945, not only declared bomber aviation 'a resource of the High Command… intended for use primarily on the main axis of combat activity', but also stated the primary mission to be support of the front line and strikes on the enemy's immediate rear. The first key principle of bomber operations was massed use, concentrated on a selected groups of targets in order to ensure their destruction, whether by single large attacks or a series of systematic bombings, citing with approval planned densities of 50 to 60 tons of bombs per square kilometre for targets in the Berlin operation. The second principle was surprise. Third came economy of force: bomber aviation should not be worn out on non-essential tasks, in order to preserve the force for hammer blows at critical points. The fourth principle stressed the

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[441] *Sbornik materialov po izucheniiu opita voini No. 24*, (Moscow: Voenizdat, 1947), pp. 27-78, 95-120, 162-193.

importance of maintaining a reserve in order to deal with inevitable losses and changes in the plan.[442]

However, two other factors were also at work. First, during operations in Soviet territory, the Soviets had the support of a powerful partisan movement behind German lines. During the three days leading up to the Bagration offensive, these forces conducted a carefully planned and targeted campaign of 40,000 demolition strikes against the German rail net in Belorussia – the equivalent of at least that many successful aircraft sorties, and conducted with hand-guided munitions. By contrast, from 4 through 12 July 1944, around 1,000 ADD (Long Range Aviation) bombers generated 2,600 sorties against railroads transporting German reserves towards Belorussia from Ukraine, all of them at night. This proved the capstone of Soviet efforts to weld the partisans into an effective force for operational interdiction, efforts underway since 1941 and bearing increasing fruit since Kursk. However, once outside the Soviet Union, the Soviets could not rely on such large-scale support to relieve the Soviet Air Force from the task of air interdiction. Even so, Soviet discussions of later operations do not indicate a rapid growth in operations against railroads. During the Oder-Vistula operation in January 1944, only 821 of 16th Air Army's 22,768 sorties were directed at railroads, bridges, and river crossings. During the course of the war, Long Range Aviation, on which the bulk of railroad interdiction fell, directed 40.4% of its sorties against enemy troops near the front line, and only 30.6% against railroads and enemy reserves as a combined category.[443]

Second, the Soviets chose not to construct an Air Force with long range aircraft. Of the 125,000 aircraft built during the war, only some 17,000 were combat aircraft with

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[442] V. D. Pallo, *Osnovi boevogo primeneniia i sposobi boevikh deistvii bombardirovochnoi aviatsii*, (Voennaia akademiia VVS Krasnoi Armii, 1945), pp. 9-19 (quote p. 9).
[443] Erickson, *Road to Stalingrad*, pp. 240-248; Erickson, *Road to Berlin*, pp. 114-115, 214-215; Timokhovich, *Operativnoe iskusstvo*, pp. 250-260, von Hardesty, *Red Phoenix*, p. 189; "Aviatsionnie obespechenie Visla-Oderskoi operatsii", (*Sbornik materialov po izucheniiu opita voini No. 25*, pp. 122-137), p. 134; I. Timokhovich, "Nekotorie voprosi operativnogo iskusstva VVS", (*Voenno-istoriischeskii zhurnal*, 11, 1971, pp. 12-21), pp. 19-21.

two or more engines, while building over 36,000 of the IL-2 series ground attack aircraft. When faced with a choice between producing more shorter-ranged aircraft or fewer longer-ranged aircraft, the Soviets invested heavily in short range and numbers. While this directly reduced their capability to conduct deeper operations against German logistics, it does not explain their relative disinterest in conducting operations against railroads within range of the Shturmoviki, despite the emphasis placed on such operations in pre-war theory and manuals.[444]

Soviet post-war writers claim their wartime experience proved their pre-war theory. More accurately, wartime experience forced them to resolve debates existing before the war, and wartime practice did not always line up with pre-war theory and doctrine. In some respects, the Soviet's practice during the war eminently suited their pre-war tenet of massive concentration of force in support of the ground force's operations, which the Soviets eventually proved adept at delivering. However, pre-war usually theory envisaged this support in terms of air interdiction campaigns carrying the mission of artillery into greater depths than the artillery could effectively reach, particularly against reserves and railroads. Soviet wartime practice concentrated much more heavily on close air support, though the depth of aviation's activity increased as the war continued. The pre-war debate on the usefulness of offensive counter-air was resolved in the war: strikes on enemy airbases were rarely attempted, though the idea was rehabilitated again in the years after the war. Equally, Novikov resolved debates on the proper subordination of the Air Force to the Army, placing the overwhelming majority of air units in Air Armies subordinate either to Fronts to the the High Command, shifted as needed to support the main effort, an underlying intent which would have been familiar to the Soviets since 1918.

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[444] "Aviatsionnaia promishlennost'", (Kozlov, et al., *Velikaia otechestvennaia voina, 1941 – 1945*, pp. 34-35), pp. 34-35.

The only strategic bombing missions the Soviets undertook amounted to prestige raids, similar to the American's Doolittle raid on Tokyo. However, the power of Anglo-American strategic bombing efforts clearly impressed them, especially when combined with the atomic bomb. The Soviets moved rapidly to build atomic bombs and bombers to deliver them, outright copying the B-29 as the Tu-4 for the purpose, though Kremlin politics in the Khrushchev era determined that the Soviets would develop missiles far more heavily than strategic bombers. The Soviets' pre-war lack of interest in strategic bombing had manifested itself in small numbers of modern aircraft suited to the task, and they built very few more during the war: doctrine, predilection, and capability all in step.

The value of efforts USAAF and RAF efforts on strategic bombing are still much debated. One clear-cut benefit of the strategic bombing campaign, however, was the simple fact that it brought the Luftwaffe to battle, held it there, and steadily inflicted losses at a rate the German war machine could not cope with. The strategic bombing campaign could pursue this goal even before Sicily or D-Day. By contrast, the Soviets had no need of a separate campaign in order to bring the enemy to battle. Locked in a desperate struggle, it would have been a grave error in the earlier years of the war for the Soviets to divert production away from aircraft necessary for immediate font-line survival, towards tasks whose longer-term payoff might not come to pass if the front lines crumbled. In the later war, as the Soviet war machine grew in power and capability, ensuring the continued advance of the Soviet Army was still the Soviet Air Force's surest means of contributing to a swift end to the war. Bombing Ploesti reduced German oil production for a time, but German oil production at Ploesti came to a complete halt when the Soviet Army overran it in September 1944.

Less visible than the aircraft, but equally important, the Soviet's most important asset in the Second World War was their ability to learn under fire. While repeatedly

demonstrated in conflicts prior to Barbarossa, the Soviets had also found it difficult to disseminate lessons learned during peacetime. They fixed this mechanism, steadily improving their performance and capabilities. Novikov's organizational reforms restored the Soviet's ability to concentrate force, a capability lost due to attempts, after Finland, to overcome shortfalls in their ability to deliver effective combat support. However, solving coordination and support problems by means of concentrating air force assets at the Army level and below essentially bypassed the core problems of training and signals.

Those problems, increasingly well-solved over the course of the war, appear to lie at the core of the disaster that overtook the Soviet Air Force in the summer of 1941. Inadequate signals lead to over-concentration of aircraft on airbases, exacerbated by deficiencies in training, and these produced the conditions in which the Luftwaffe's strikes could have maximal effect. Inadequacies in signals continued to plague the Soviets through 1941, with the situation slowly improving from 1942 onwards as more signals gear, especially radios, became available, and Soviet training programs became better able to provide trained operators. Soviet training programs for aircrew and officers had also been inadequate before the war, pressured by both purges and rapid expansion. As with signals, training problems were overcome as the war went on, but training inadequacies cost the Soviets dear in losses of pilots and aircraft, both in combat and in routine flying. Among the clearest lessons of the Soviet experience in World War 2 is also one of the oldest: time spent on training is never wasted.

Conclusion

There is probably no one aspect of the employment of aviation that all Soviet theorists would have agreed on without reservation in the period 1918 - 1945. Nonetheless, several patterns do emerge from this period. By far the clearest consensus, throughout both the entire time period and across various concepts of the use of an air force, formed around the concept of employing aviation en masse for decisive effect. Most, though not all, would further agree that such massed employment should be directed down the axis of the ground force's main effort, enabling decisive results for the Army's operations. Neither of these notions should be terribly surprising. The concept of mass applied to ground warfare for centuries, and finds easy application to aerial warfare. Equally, the air force of a continental power expecting to fight continental wars cannot rationally ignore the necessity of supporting the war on the ground, where victory or defeat can come with both swiftness and finality. Indeed, had the Soviets concentrated solely on building a strategic bomber force in the 1930s, they probably would have been worse prepared for Barbarossa and less able to bounce back so well from disaster. Equally, the assertion that the Soviets placed primacy on the ground support mission is not groundbreaking. However, this thesis has shown the depth and staying power of this primacy in Soviet attitudes in greater detail than prior works have done. In addition, this study shows the twists and turns of Soviet thinking in greater detail than has been done previously, falling into neither of the two common reductionist traps: of asserting a monolithic body of ever-more-perfect theory, nor that of asserting the Soviets slavishly or incompetently copied from the Germans.

The charge of copying from a foreign model, especially German, claims that the Soviets learned how to organize and utilize an air force from the German officers sent to the Soviet's Air Force Academy from 1924 through 1933. Doubtless the students learned

something from their instructors, German and Soviet. However, mere presence is not evidence of decisive influence. Were that the case, there should be evidence of a significant shift in Soviet attitudes and writings beginning in or after 1924, attributable to the influence of German views on air power. This evidence is not present. First, as noted in Chapter 1, the fundamental tenets of Soviet thinking were in place by 1922, the resurgence in Soviet debate on the use of airpower began in 1923 and had not been absent prior to that point; and the very presence and variety of points of view debated by the Soviets demonstrates conclusively that they were not blindly copying from anyone. Second, the central tenets of Soviet thinking on airpower do not appear to have changed in the period 1918 - 1933 in a manner that is both otherwise inexplicable and in the direction German instructors would likely have pushed them. In fairness, the latter could be difficult to detect, since German thinking on the employment of aviation bore striking similarities to Soviet thinking, even before the exchanges began. These similarities are hardly surprising, since both were continental powers, facing more powerful enemies, and re-examining their military thinking in the wake of major systemic shocks: defeat in Germany, and defeat followed by radical revolution in the Soviet Union. Mary Habeck's work comparing the evolution of armor doctrine in both countries notes that despite their collaboration, German and Soviet officers cordially despised each other, and that the parallel development of doctrine in the two countries demonstrates convergent evolution (similar solutions to similar problems in similar circumstances, such as the barracuda and the northern pike). Unless evidence comes to light on the Soviet side demonstrating that the Soviets believed themselves deeply indebted to their German instructors, the case for Soviet doctrine being entirely or largely taught by German instructors must remain 'not proven' at best. Foreign influences certainly existed, through translations of foreign articles and manuals, contacts with officers in foreign air forces, and observations of

foreign manoeuvres. Yet the very existence of the extensive Soviet debates demonstrates that nothing was taken on board uncritically. The foundation of the Soviet approach to airpower lies in the Soviet's own perceptions of their strategic situation and the role of aircraft in it. While other nations discussed close air support, only the Soviets put in the effort to develop a purpose-built aircraft for the job: the thoroughly successful and massively produced as the IL-2 Shturmovik. The Soviets put in the effort to see the project to success precisely because the desired end product closely matched their perception of their needs. If they were blindly copying other's ideas, why did they not build fleets of slow single engine Stuka dive bombers instead, or continue development of the Pe-8 heavy bomber to rival the B-17?[445]

Over the thirty year span of this study, Soviet attitudes on how exactly the ground forces ought to be supported varied widely. The broader movement of their views on the topic followed understanding of the reality they faced. In the 1920s, massive close air support strikes were not feasible for their air force, and thus all assume that the then-current Soviet Air Force would be mostly be conducting the reconnaissance and patrol missions that lay within its grasp. Any offensive mission would, necessarily, be conducted by a force concentrated to win the ability to act in the air for a limited time and space. However, this study also shows the existence of another point of view: that the Soviet Air Force should be preparing for operations with a much larger force than they then possessed. This split in opinion underlay much of the debate on the use of airpower in the middle 1920s, but dropped out of sight towards the end of the 1920s as it became clear that Soviet industrialization was going to include a massive rearmament effort.

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[445] Mary Habeck, *Storm of Steel: The Development of Armor Doctrine in Germany and the Soviet Union*, 1919-1939, (Ithaca: Cornell University Press, 2003); for mutual attitudes see especially p. xi; James Corum, *The Luftwaffe: Creating the Operational Air War, 1918-1940*, (Lawrence: University of Kansas Press, 1997). The Stuka dive bomber proved increasingly vulnerable and underpowered from 1940 onwards, and its closest counterpart in Soviet service was the Pe-2 dive bomber. Most of the world's powers used fighters, such as the Fw-190 or the Typhoon, in roles approximating that of the Shturmovik. The German Hs-129 was an armored purpose-built aircraft like the IL-2, but it did not prove very successful and was built only in small numbers.

With available aircraft increasing in numbers and capabilities, Soviet thinking ran towards deeper strikes. Many were essentially calling for a focus on air interdiction missions, bombing railways and troop columns in support of the land forces, though some began advocacy of strategic bombing in the Douhetian mould. Virtually all presumed that bombing airbases would prove key in attaining control of the skies. While this thesis is unfortunately unable to explain the sudden shift of attitude on the part of some Soviet theorists to a Douhetian stance in 1935, it is able to show when the shift began, and that it ended when Soviet fighters entered combat over Madrid in 1936. Equally, this thesis shows why some aspects of a Douhetian understanding of the importance and missions of heavy bombers might be attractive to the Soviets, because of their debate at the time over the effectiveness of fighters against bombers in air combat.

In its third chapter, this thesis breaks new ground by examining the impact of the small wars the Soviets fought in from 1936 through 1940. The war in Spain began the process of providing a reality check on Soviet theorizing, showing that strikes on airbases were difficult to execute effectively and bombers far from invulnerable to fighters. Throughout the small wars leading up to the Soviet's involvement in World War 2, the gap between missions' theoretical simplicity and their practical difficulties showed steadily. Soviet analysts appear to have kept pace with events, but analysis and leasson learned were not effectively disseminated to line units, causing a failure of translating theory and analysis into training and effective execution. Only during the Finnish War did this gap manage to command their attention as a force-wide problem instead of a localized circumstance. Unfortunately, not all of the Soviet's solutions proved viable, not least because of further practical problems with training, supply of signals equipment, and political problems evidenced by an outbreak of nine-millimetre aneurysms and extended Siberian vacations amongst knowledgeable and experienced officers.

As this thesis demonstrates, the Soviet Air Force found itself ill prepared for war on 22 June 1941 due not only to surprise or simple incompetence, but due to interlocking effects of systemic difficulties with signals and training leading to poor solutions being chosen to solve command and control problems and basing issues. While this may not prove to be the full answer to the reasons underlying the Soviet Air Forces' disaster in 1941, it is nonetheless the most complete explanation yet.

The Soviet's learning process, ticking over but ignored until the Finnish War, provided one of the key supports for the Soviet Air Force's recovery and eventual victory. Nonetheless, the Soviets' frequent claim that prewar theory was validated by wartime experience is paradoxical, simultaneously inaccurate in detail while accurate in broad strokes. Prewar Soviet theory did provide the Soviets with a vision of what they wanted to accomplish: closely coordinated massed employment of air power on the ground force's decisive axis. However, that vision failed to include the details of its own implementation. Some aspects of the vision's implementation in the months immediately before Barbarossa proved quite faulty, such as subordinating most of their airpower to armies. Other aspects of prewar thinking went largely by the board due to circumstances during the war, with strikes on airbases a relatively rare occurrence and operational interdiction of the type frequently described in prewar writings taking a distinctly secondary role to tactical support strikes. That the Soviets eventually arrived at a point close to that indicated by their initial overarching vision should not obscure the fact that the end point was not, in all respects, the same as the one initially described. Equally, however, possession of that overarching vision provided direction and purpose to the Soviet's learning efforts, without which their effects at recovery would likely have floundered instead of being directed to a goal. By the middle and late war, the divergence between the vision and the execution usually stemmed from practical circumstances, not

from repudiation of the vision, which in turn explains such phenomena as post-war Soviet analysts using the Soviet's Second World War experience to justify the importance of offensive counter-air.

Overall, the Soviet approach proved itself in its own terms. However, even at the end of the war, its performance might well have been judged as poor in some regards by a prewar commentator such as Lapchinskii. He might well have wondered about the Soviet's relative failure to conduct bombing strikes to paralyze the German operational rear under conditions of near total air superiority near the end of the war, especially when compared to the effort expended and results achieved in this sphere by the Western allies. The Soviets forged a powerful weapon for tactical support, but in the process discarded not only their nascent strategic bomber force - a luxury in the Soviet's own frame of reference - but also largely abandoned large-scale efforts beyond close air support until late in the war. Admittedly, the Soviets could ignore this air interdiction because partisan raids provided the Soviets with an alternative source of interdiction until they had expelled the Axis from the Soviet Union in 1944, but the Soviets were not fully successful at air interdiction by the end of the war in their own terms. Even so, the Soviet Air Force provided vital assistance to the Soviet Army in defeating the Axis. If its performance was never perfect, by the end of the war it was adept at providing the Soviets with the close air support support they desired and working on providing the level of air interdiction they hoped for.

Soviet experimentation on means of implementing their vision did not end with the close of the Second World War. The later-war methodology of the air offensive, committing massive air support on the decisive axis, using air power to pave a path for the breakthrough and then escorting the exploiting units into the depths, while Soviet Air Force support units moved their airbases forward to ensure the forward echelon would not

outrun its air support, became a staple of Soviet Air Force thinking. Russian analysis of World War 2 operations for lessons pertinent to current operations continues to this day.[446] Following through on their lack of intense interest before and during the war, and for all that the Cold War Soviet Air Force liked to emphasize its reach through styling itself as "long-ranged, missile-equipped" [dal'nii, raketonosnii], strategic bombing remains the unloved stepchild of the Soviet Air Force. They developed aircraft for the role, and some have had quite a long service life, but the Soviet nuclear deterrent rested primarily on missiles controlled by a separate branch of the armed forces, leaving the Soviet Air Force to concentrate on tactical and operational support. Indeed, in 1997 Marshal of Aviation Ievgenii Shaposhnikov questioned the need for heavy bomber aviation at all, especially in light of their cost and the Soviet Air Force' budgetary difficulties.[447]

Experimentation with the organization of the air force did not stop, either. In the 1980s, the Soviets moved to greater decentralization of Frontal Aviation, in the interests of improved cooperation with the ground forces, just as they did after the Finnish War - and the experiment was overturned in 1988 on much the same grounds as Novikov's in 1942: the need to concentrate forces as needed. The missions once filled by Troop Aviation increasingly have been filled by helicopters (in Aviatsiia sukhoputnikh voisk, Army Aviation) since the 1960s, but the subordination of these has ping-ponged back and forth between ground units, the Soviet Air Force, and the High Command. Nonetheless, most Soviet Air Force officers still see support for the ground forces as their defining

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[446] For example, M. Kozhevnikov, "Sovershenstvovanie avaitsionnogo nastupleniia", (VIZh, 5, 1971, pp. 14-21); M. Cherednichenko, "Razvitie teorii strategicheskoi nastupate'noi operatsii v 1945-1953 gg.", (VIZh, 8, 1976, pp. 38-45; or A. N. Efimov, "Primenenie aviatsii pri vedenii operatsii v vysokikh tempakh i na bolshuyu glubinu (po opytu Vislo-Oderskoi operatsii)", (VIZh, 1, 1985, pp. 22-29).

[447] Stéphane Lefebvre, "Difficult Times for the Russian Air Force, 1992 - 2002", (*The Journal of Slavic Military Studies*, Volume 16, March 2003, Number 1, pp. 44-68), pp. 54. Shaposhnikov originally in Rossiiskaia gazeta, (10 July 1997), p. 1. This article originally published as "The Reform of the Russian Air Force", monograph B57, (Conflict Studies Research Center, RMA Sandhurst, July 2002.)Translations either CSRC or Stéphane Lefebvre.

mission. A list of the primary missions of the Soviet Air Force written in 2001 by Soviet Air Force Commander in Chief Kornukov boils down to attaining and maintaining air superiority, and supporting ground forces.[448]

Nonetheless, this thesis cannot claim to be the last word on this topic. Archival access might clear up many questions, by allowing insight into Soviet decision-making, or closer access to the operational records to permit better analysis of the actual changes in thinking and practice during the various wars the Soviets fought. Many of the major personalities mentioned in this thesis are ciphers, and the rest are known only through Soviet-era biographies that verge on hagiography, and ghost-written memoirs. This thesis essentially ignores air defence and naval aviation, along with nearly every aspect of air unit tactics. All these topics warrant further study. This thesis does, however, provide further studies with an improved framework within which to understand the twists and turns of Soviet Air Force thinking.

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[448] Stéphane Lefebvre, "Difficult Times for the Russian Air Force, 1992 - 2002", (*The Journal of Slavic Military Studies*, Volume 16, March 2003, Number 1, pp. 44-68), pp. 47-58. Kornukov's comments originally in "Apropos of the Grown Role of Confrontation in the Aerosapce Sphere and air Force Tasls in 21st-Century Military Operations", (Military Thought, 10/5 2001, p. 11). Translations either CSRC or Stéphane Lefebvre.

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Soviet Air Force Loss Statistics[449]

	1941	1942	1943	1944	1945	War's End	Total
Initial Combat Aircraft	20	12	21.9	32.5	43.3	47.3	20
Initial Other Aircraft	12.1	9.9	13	13.9	15.7	16.9	12.1
Total Initial Strength	32.1	21.9	34.9	46.4	59	64.2	32.1
Combat Aircraft Received	9.9	22	33.1	35.6	15		115.6
Other Aircraft Recived	1.1	5.7	5.1	7.5	3.5		22.9
Total Aircraft Received	11	27.7	38.2	43.1	18.5		138.5
Total Available	43.1	49.6	73.1	89.5	77.5	64.2	170.6
Combat Losses	10.6	5.6	15	20.1	9		60.3
as a % of Total Available	24.6%	11.3%	20.5%	22.5%	11.6%		35.3%
% of Initial Combat Aircraft	53.0%	46.7%	68.5%	61.8%	20.8%		301.5%
Combat Losses Per Month	1514	467	1250	1675	1800		1160
Non-Combat Losses	10.6	9.1	11.7	10.4	4.3		46.1
as a % of Total Available	24.6%	18.3%	16.0%	11.6%	5.5%		27.0%
as a % of Total Losses	50.0%	61.9%	43.8%	34.1%	32.3%		43.3%
per Month (actual number)	1514	758	975	867	860		887
Total Losses	21.2	14.7	26.7	30.5	13.3		106.4
per Month	3029	1225	2225	2542	2660		2046
as a % of Total Available	49.2%	29.6%	36.5%	34.1%	17.2%		62.4%

Combat Aircraft Available	29.9	34	55	68.1	58.3	135.6
Non-Combat Aircraft Available	13.2	15.6	18.1	21.4	19.2	35
% Avail Combat A/c Lost	35.5%	16.5%	27.3%	29.5%	15.4%	44.5%
% Avail Non-Combat A/c Lost	80.3%	58.3%	64.6%	48.6%	22.4%	131.7%

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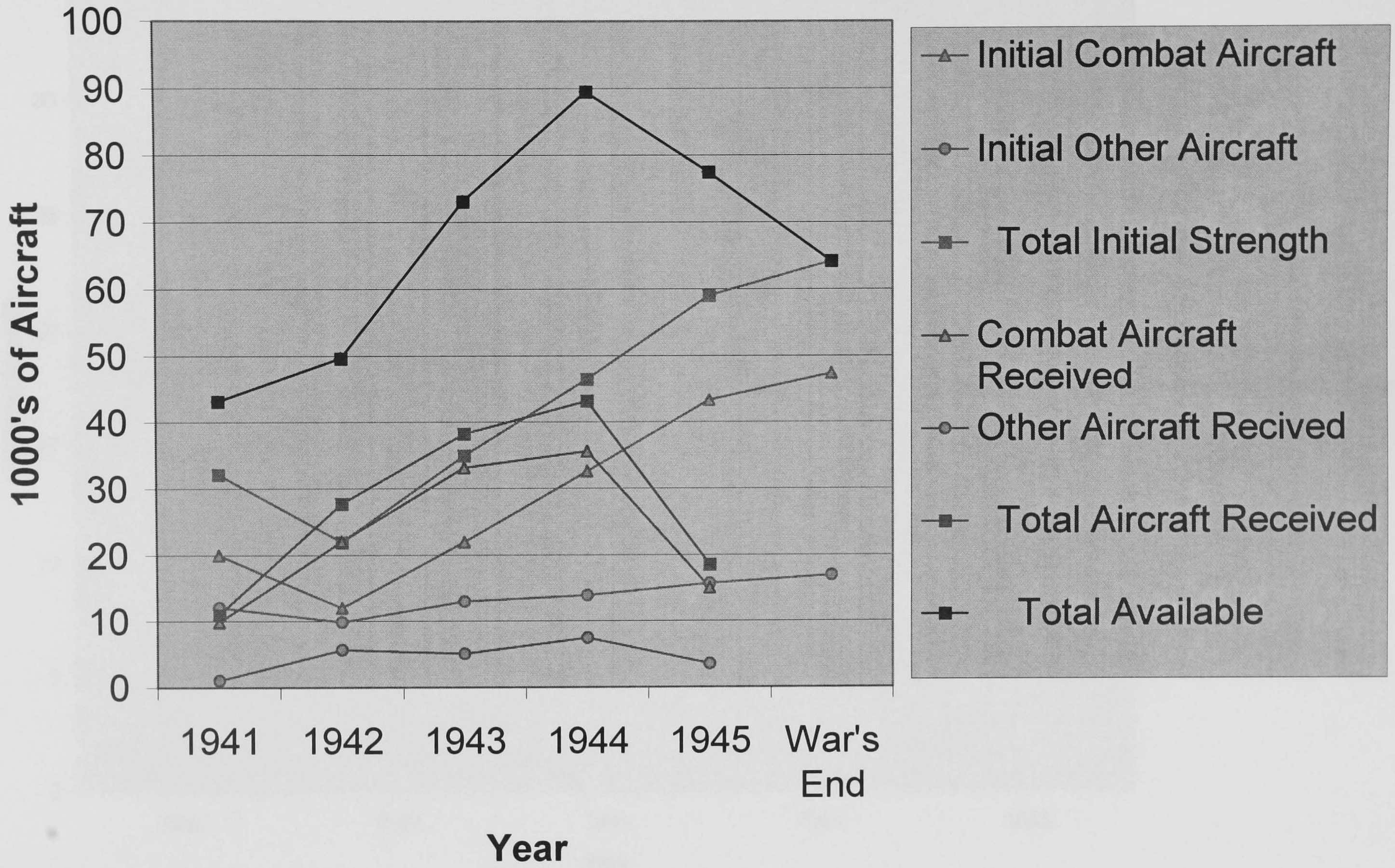
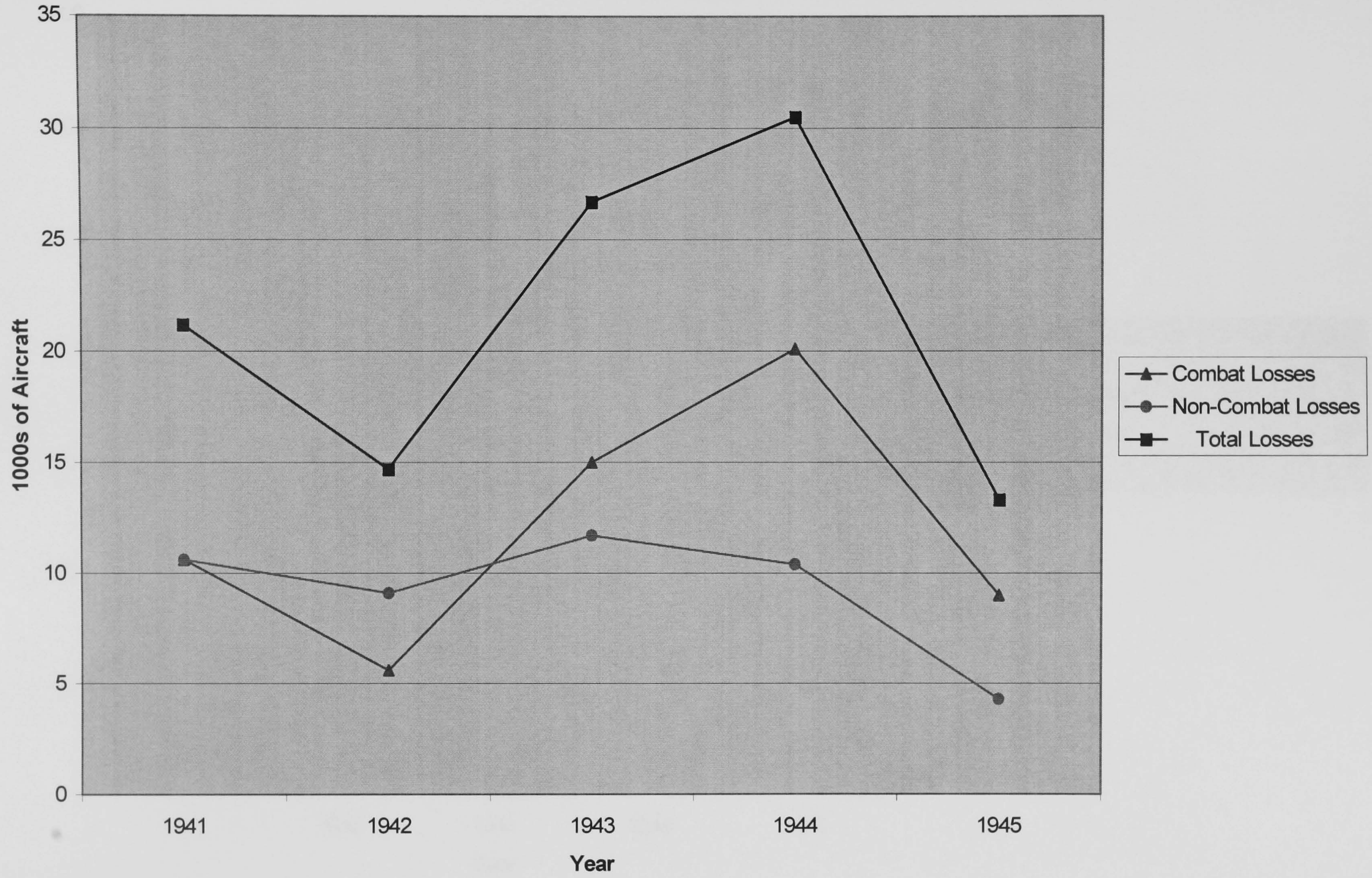
[449] All source data in these charts and tables comes from or is derived from: G. F. Kirovsheev, *Soviet Casualties and Combat Losses in the Twentieth Century*, (London: Greenhill, 1997), pp. 222, 254-255.

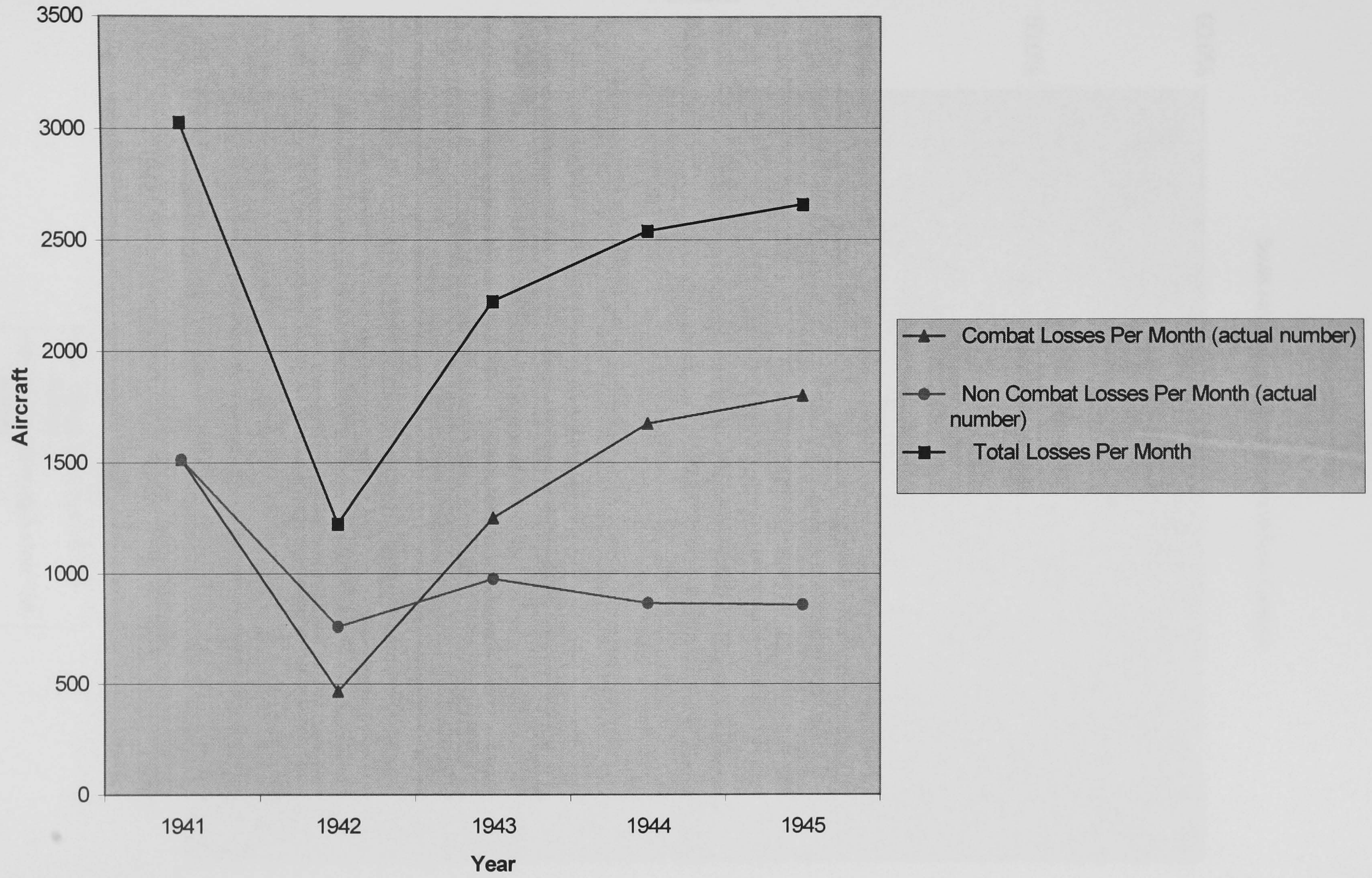
Soviet Aircraft Strength

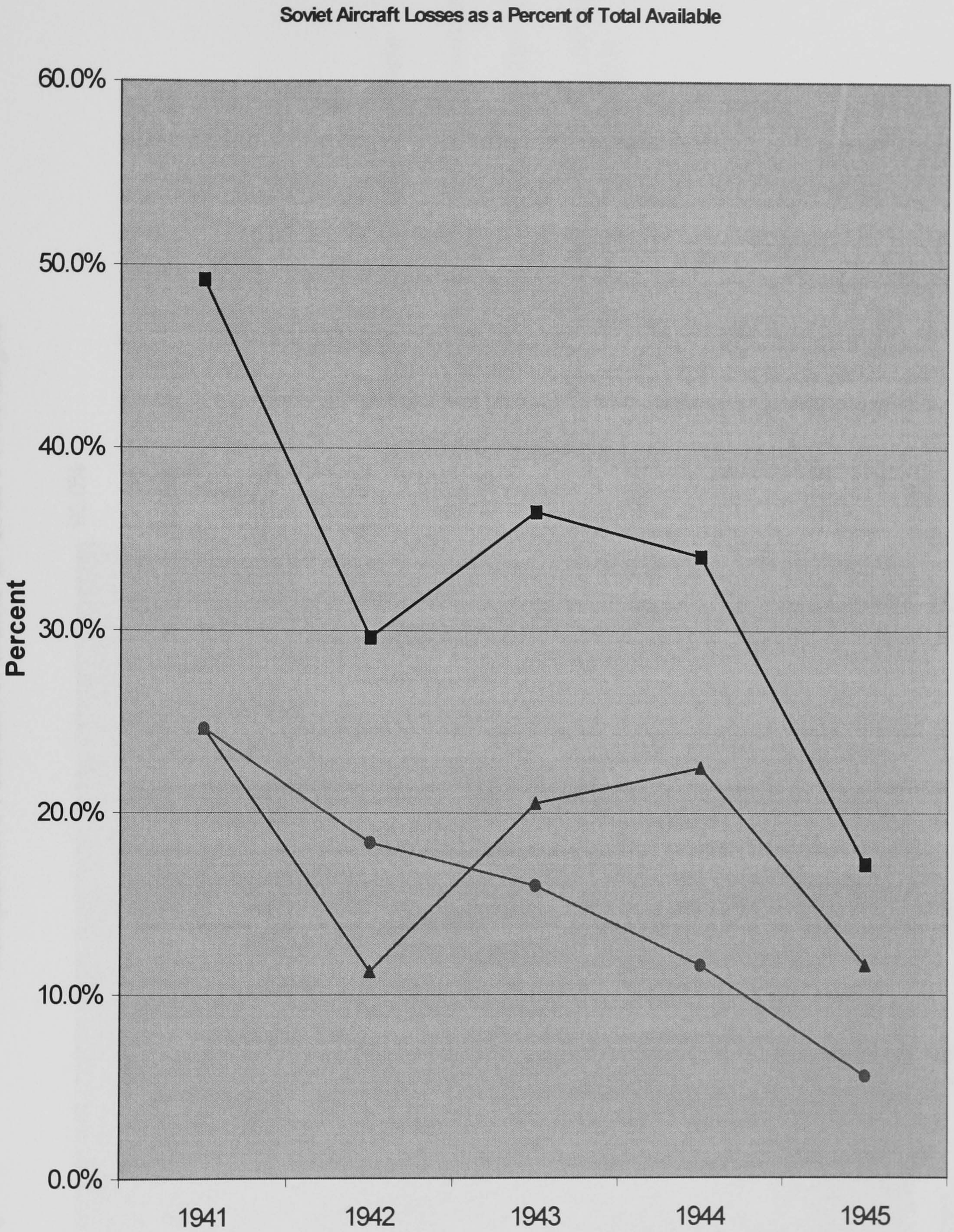


Soviet Aircraft Losses

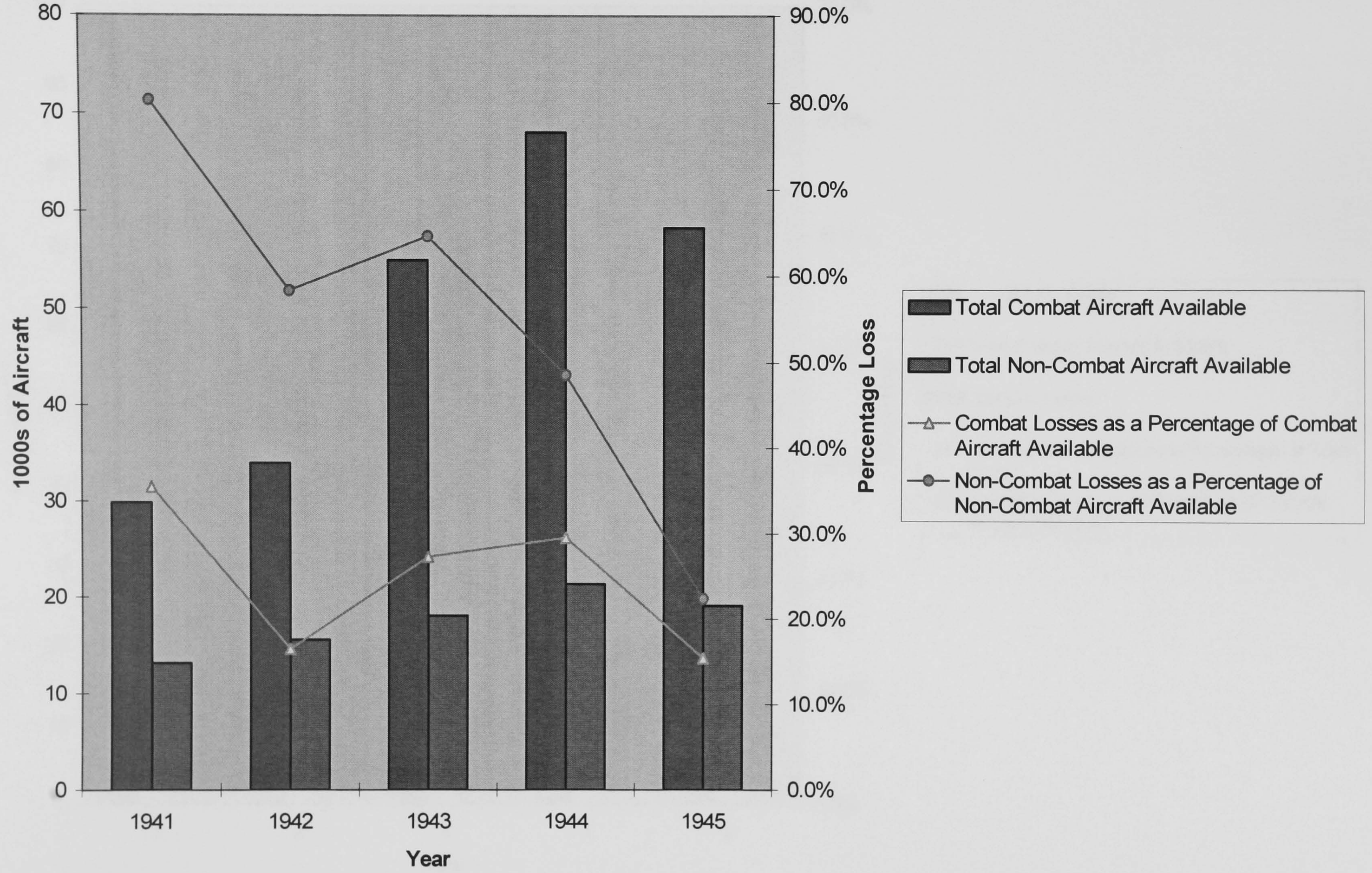


Soviet Aircraft Losses Yearly Per-Month Average

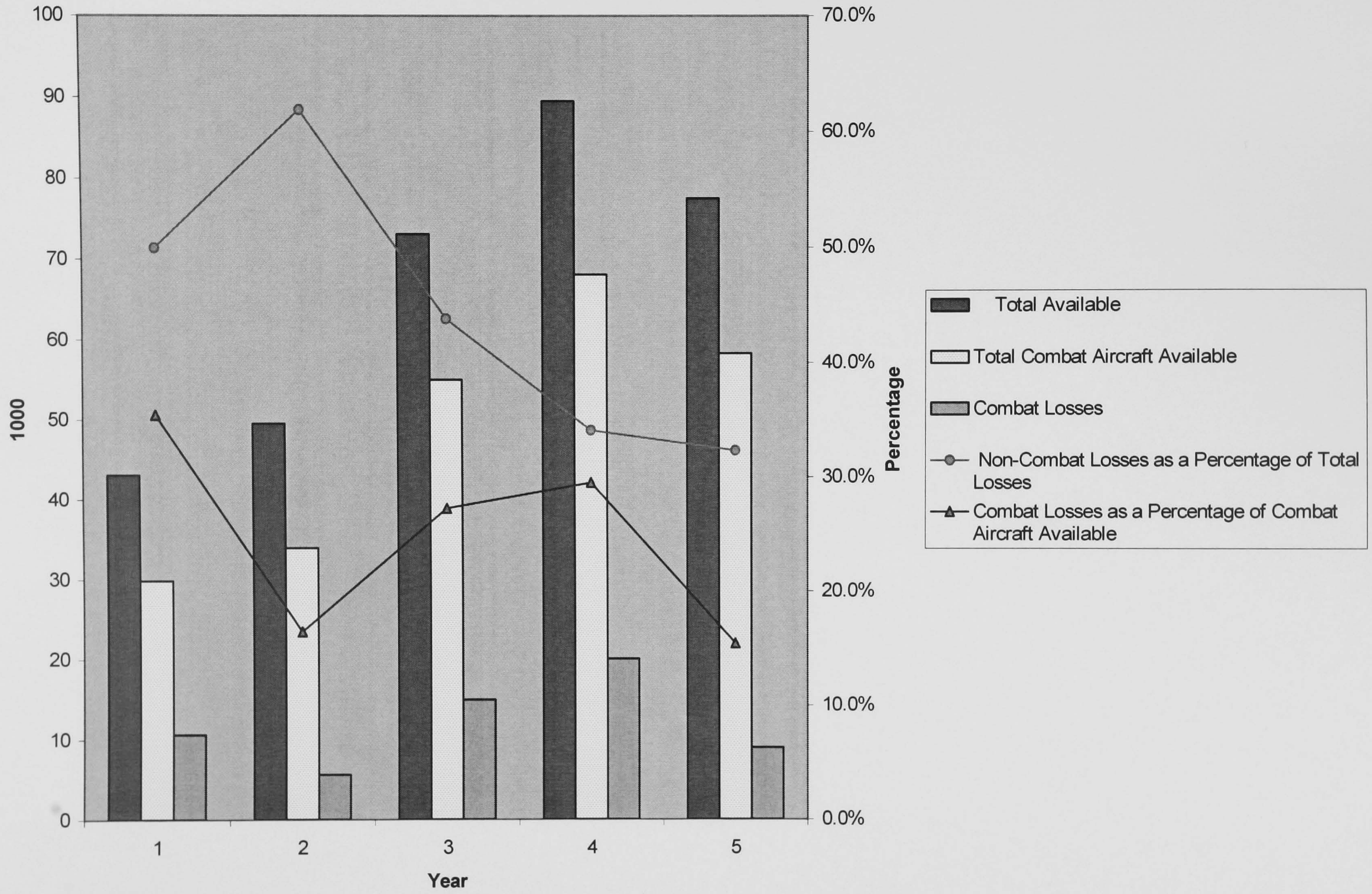



Soviet Aircraft Losses as a Percent of Total Available
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent
1941
1942
1943
1944
1945
Year
Combat Losses as a % of Total Available
Non-combat Losses as a % of Total Available
Total Losses as a % of Total Available

Comparison: Aircraft Available to Loss Percentages



Available Aircraft, Losses, and Loss Percentages



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